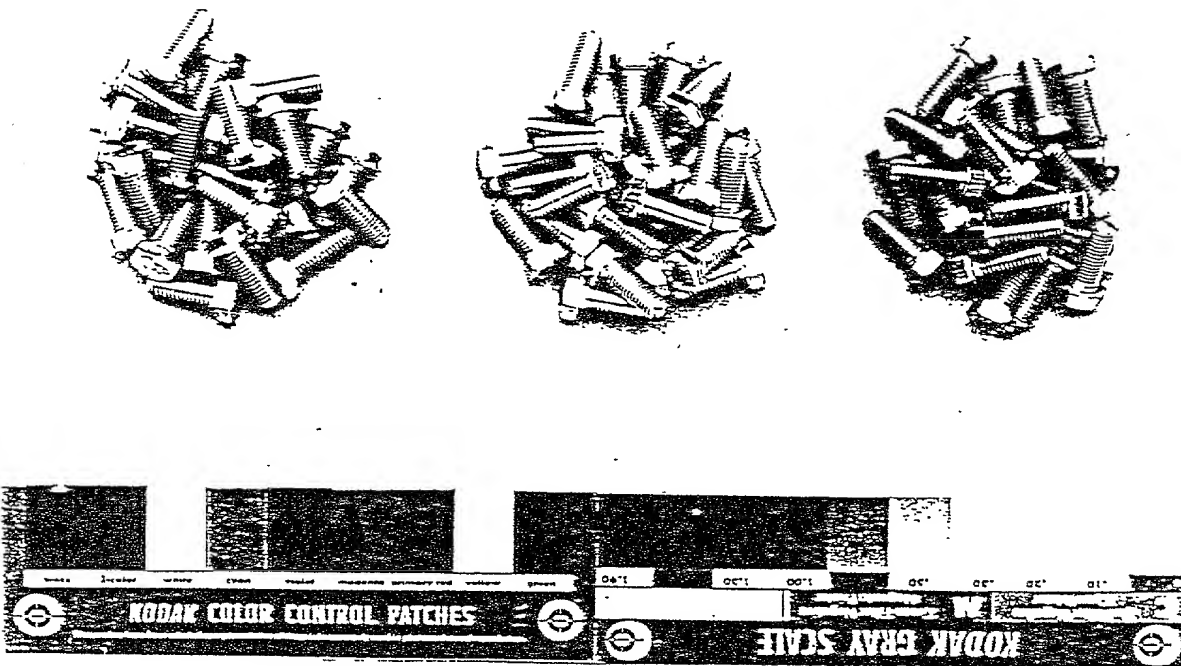


Fig. 1

Color comparison of various passive layers



Substrate: Zinc-plated screws

Blue chromation:	Left picture half
Invention:	Center
Yellow chromation:	Right picture half

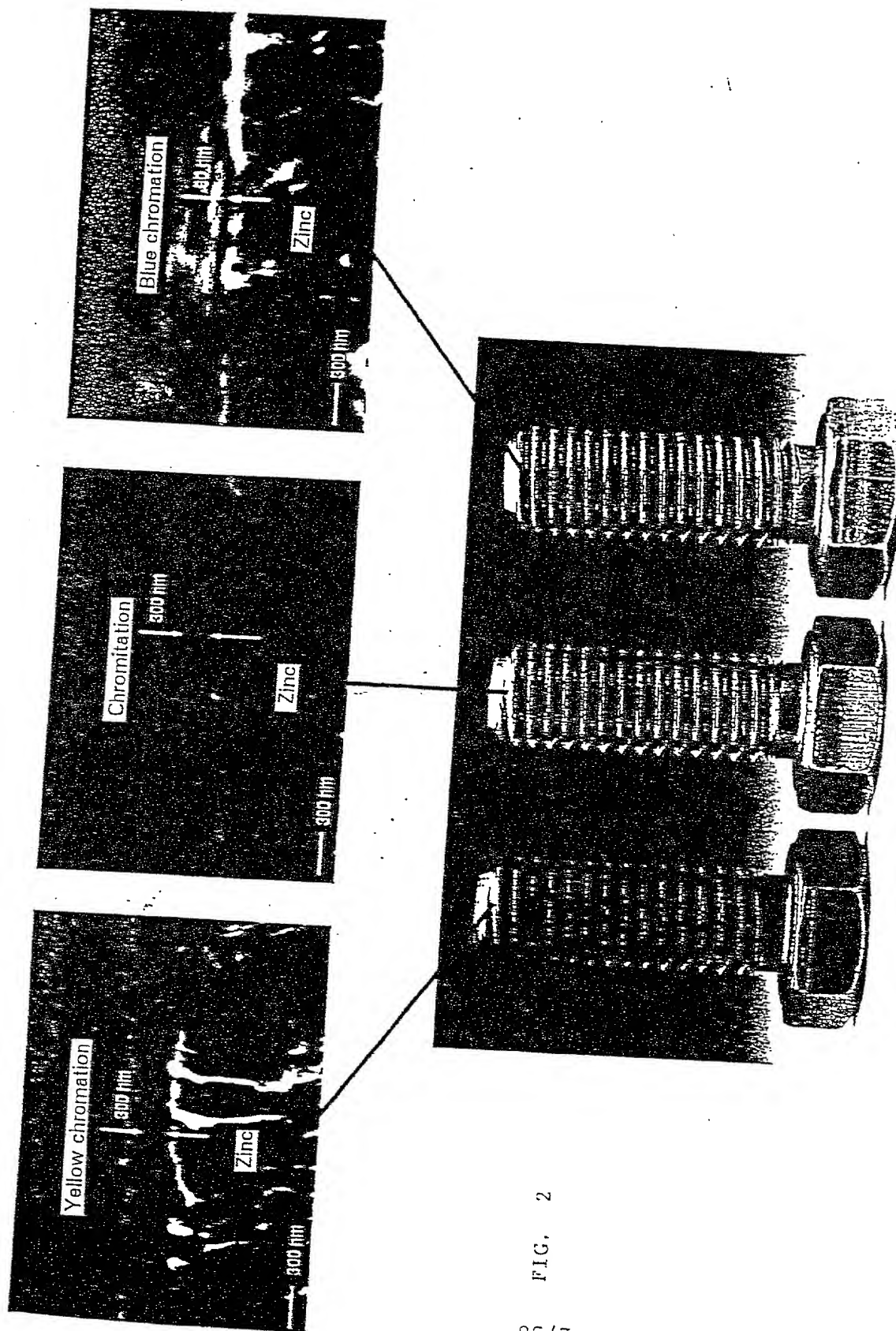


FIG. 2

Fig. 3

Bandwidth of iridescence according to the present invention
(on zinc-plated screws)

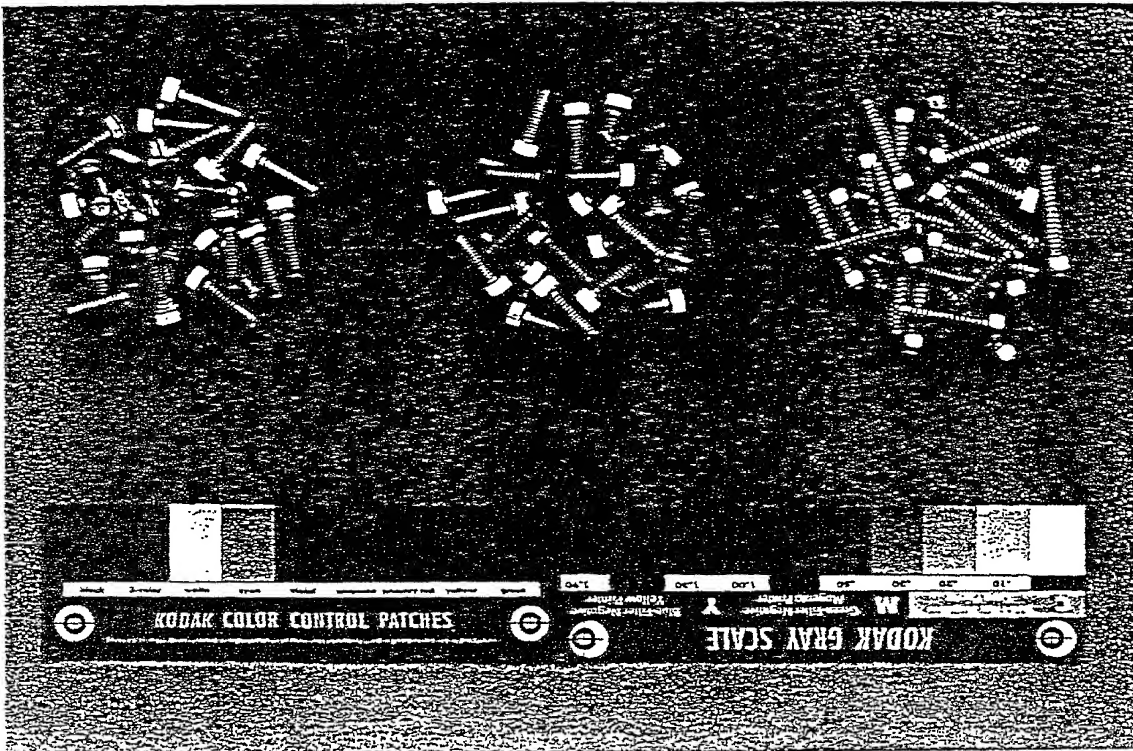
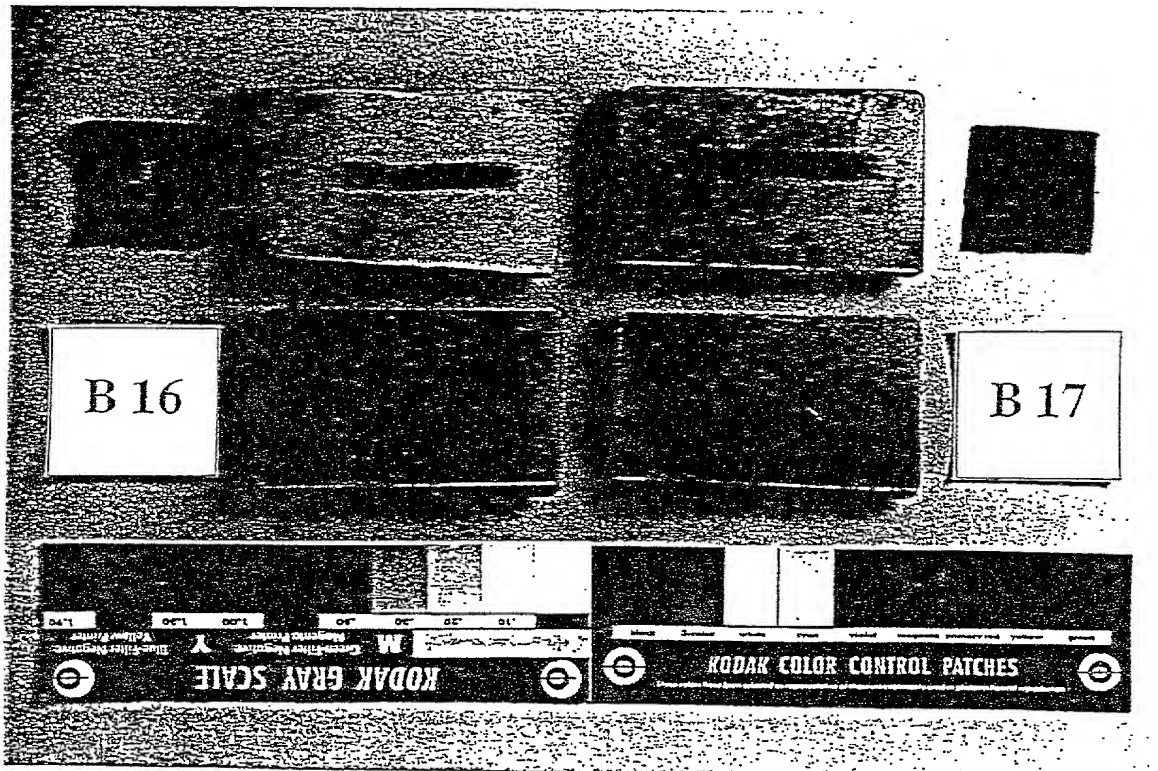


Fig. 4

Comparison test with EP 0 034 040

Example 16

Example 17



The upper picture half, one the outer left and right, shows a black cloth whereby the abrasions on the metal sheets shown in the top picture half were obtained. Layer portions - discernible as whitish stains - are on both pieces of cloth. The lower picture half shows the unmarred layers of the prior art.

Substrate: Zinc-plated steel sheet.

Diagram 1

Pattern 1, Measurement Position A

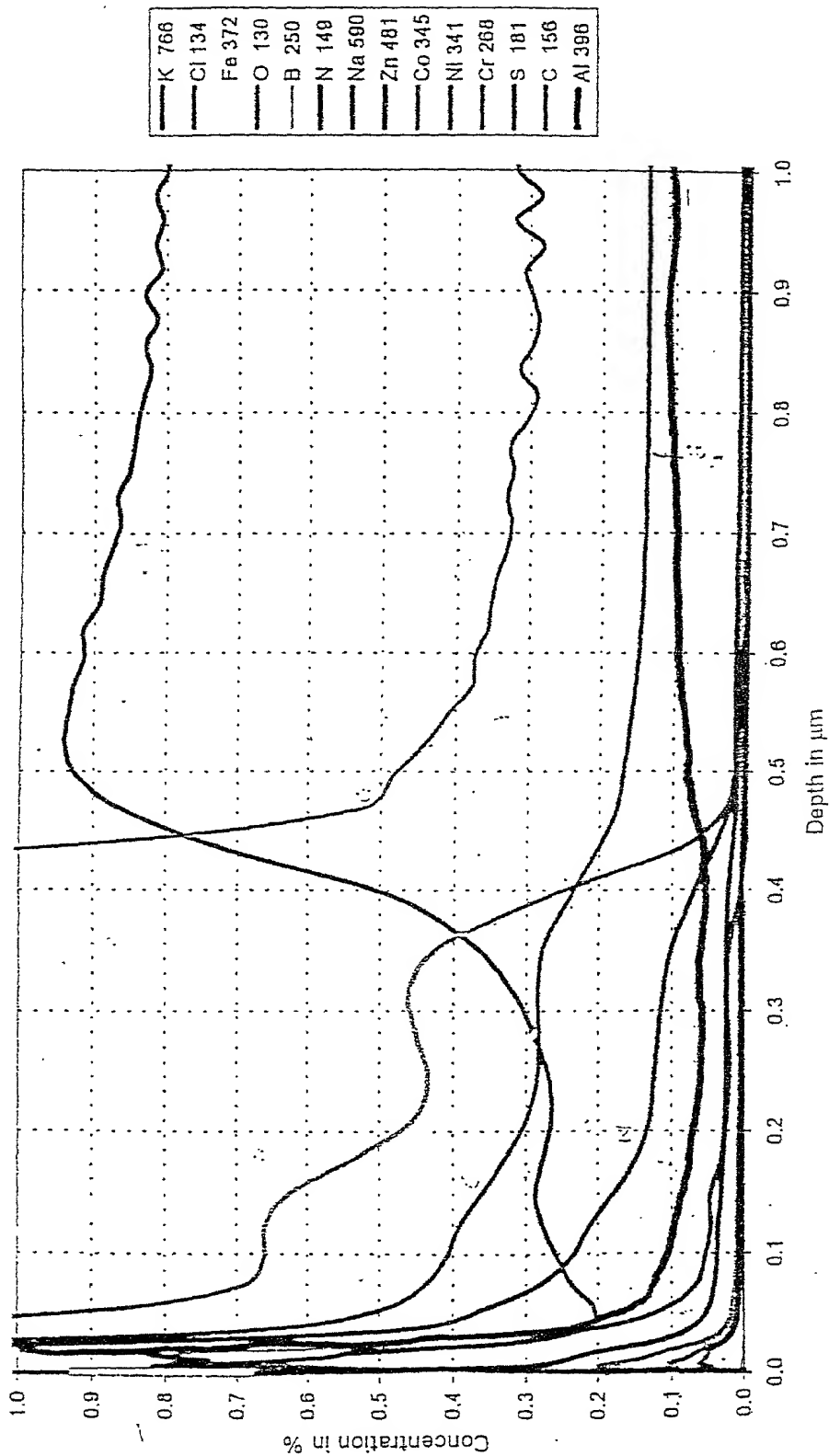


Diagram 2

Pattern 1, Measurement Position A

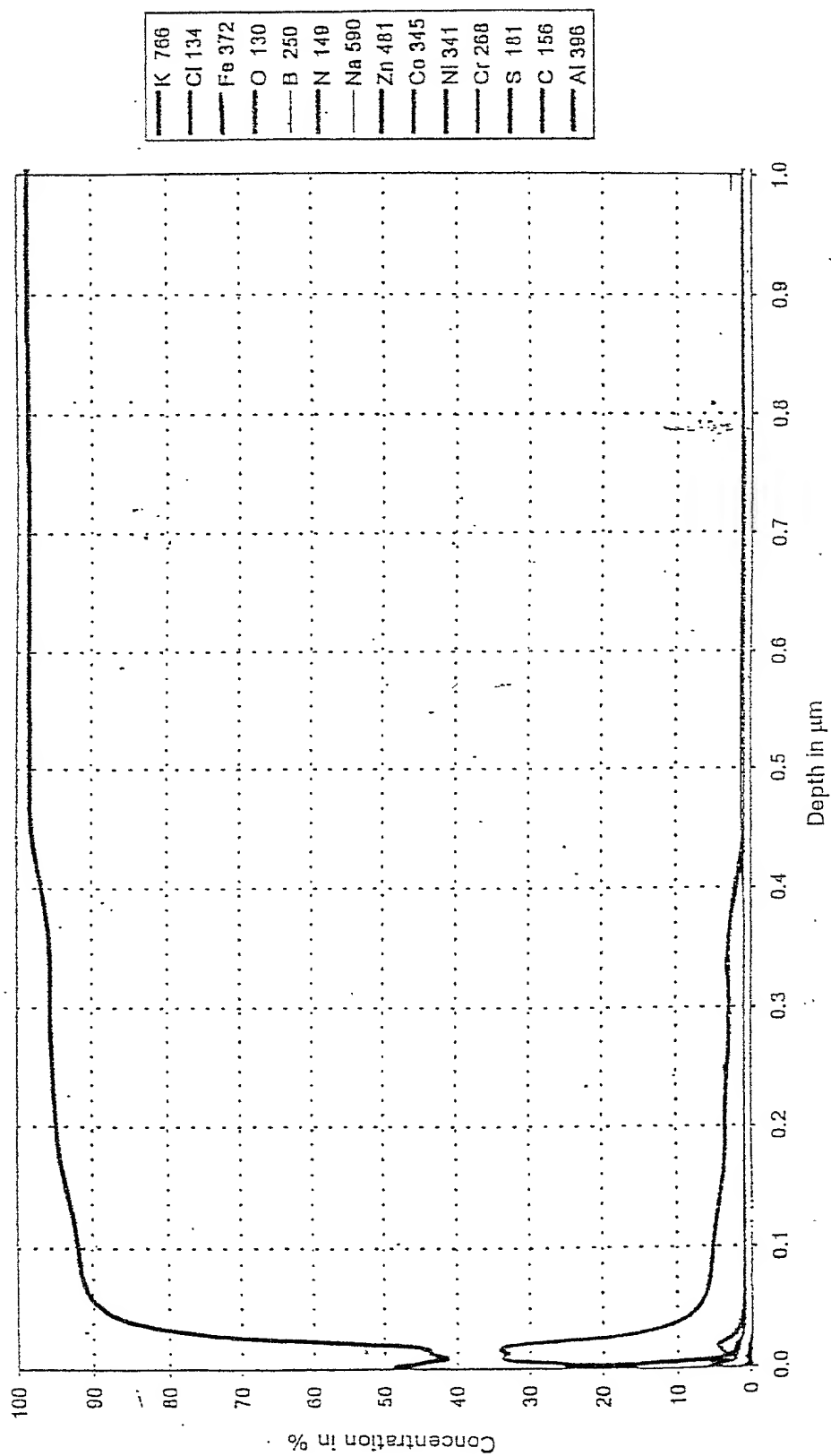


Diagram 1

Sample 1, Measurement Position B

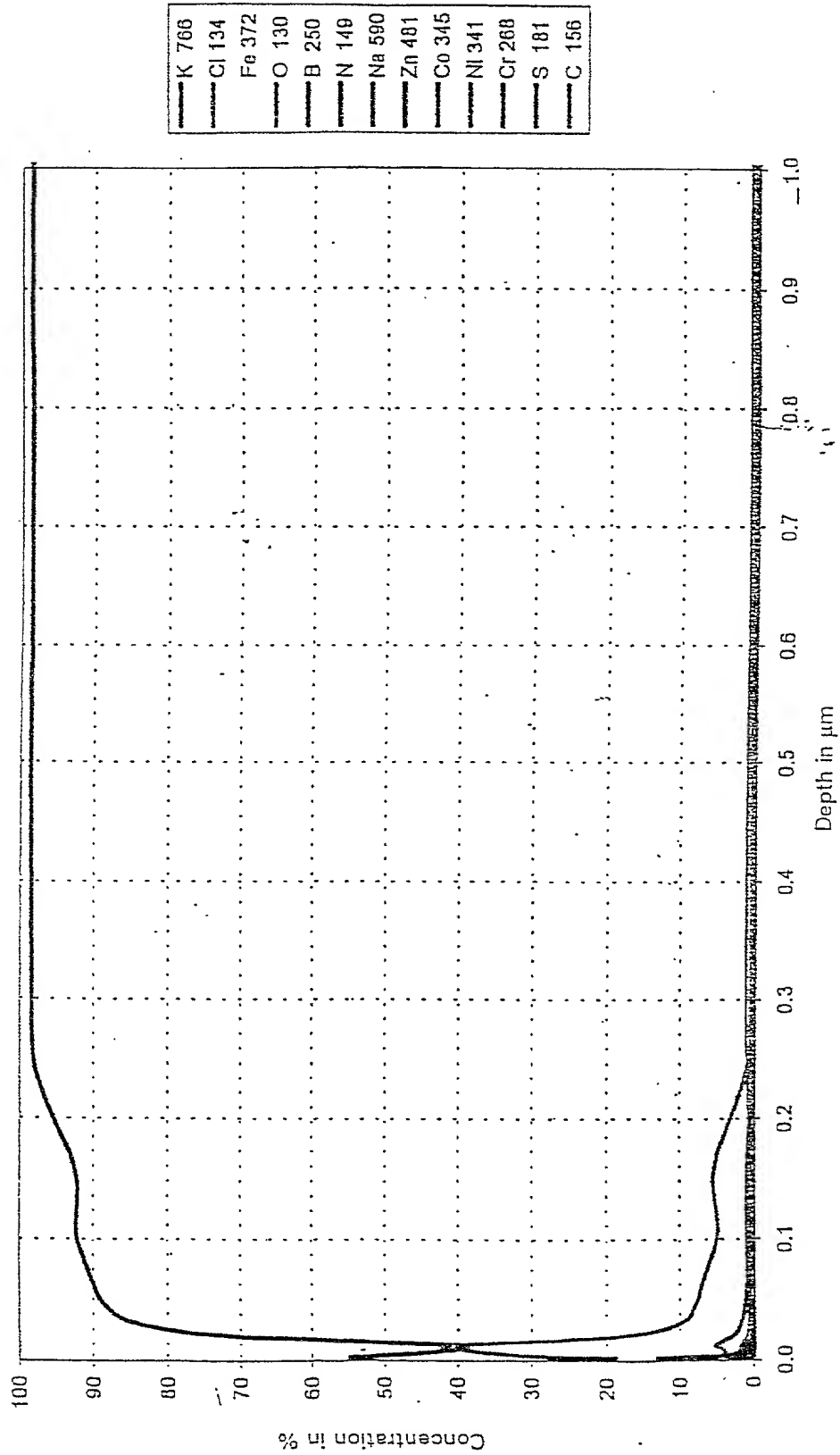
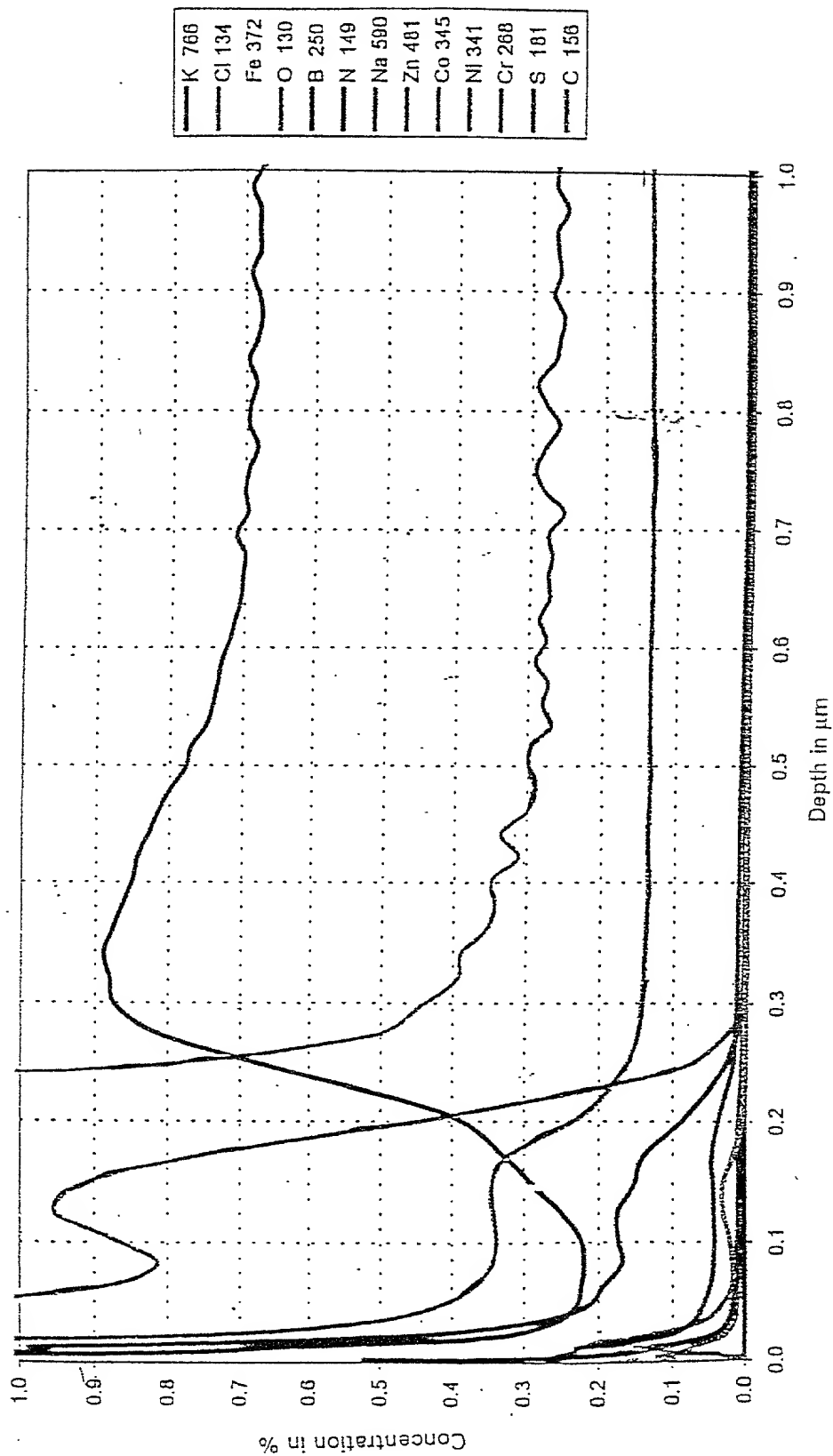


Diagram 2
Sample 1, Measurement Position B



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 288
—	S 181
—	C 156

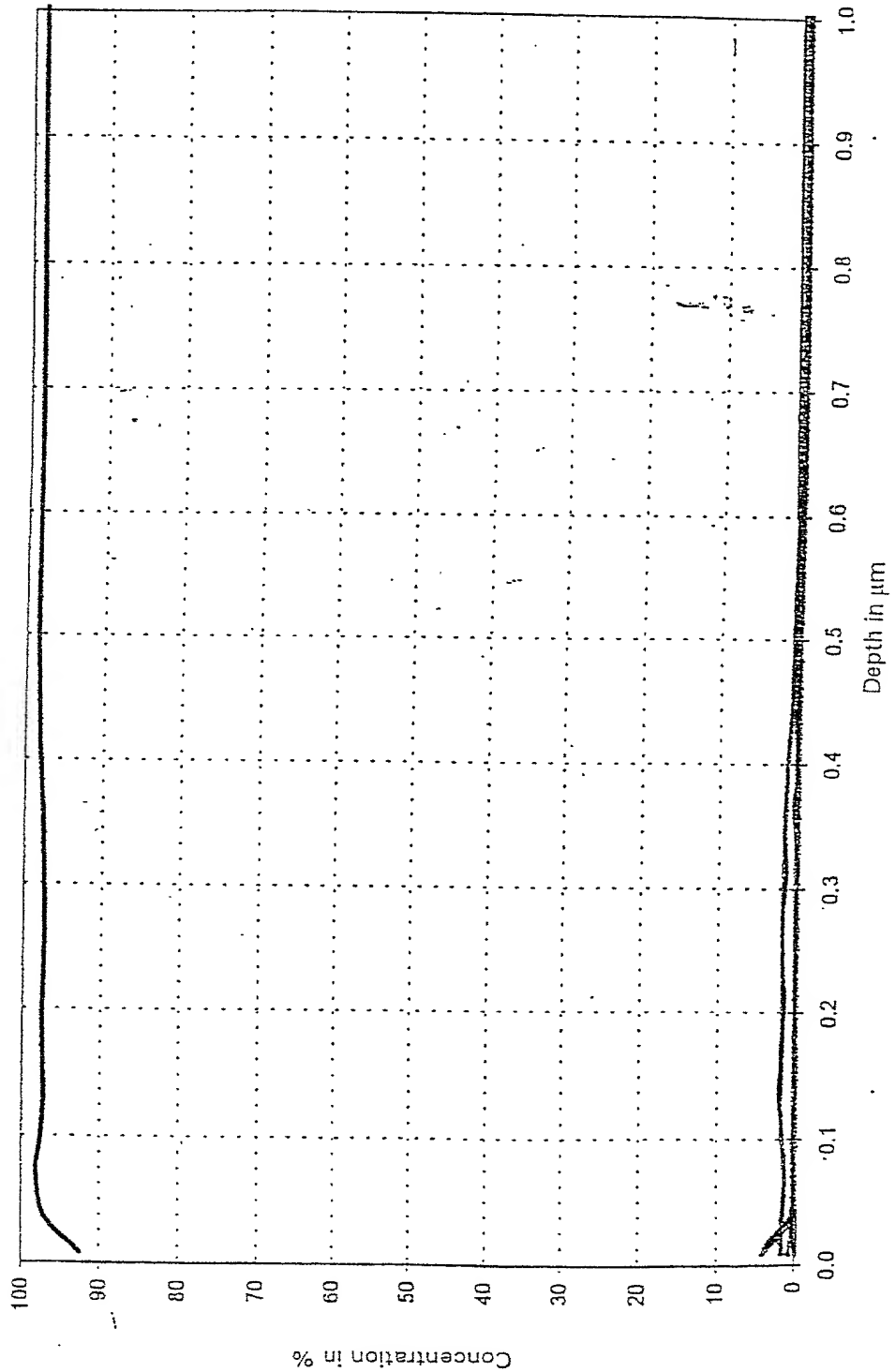


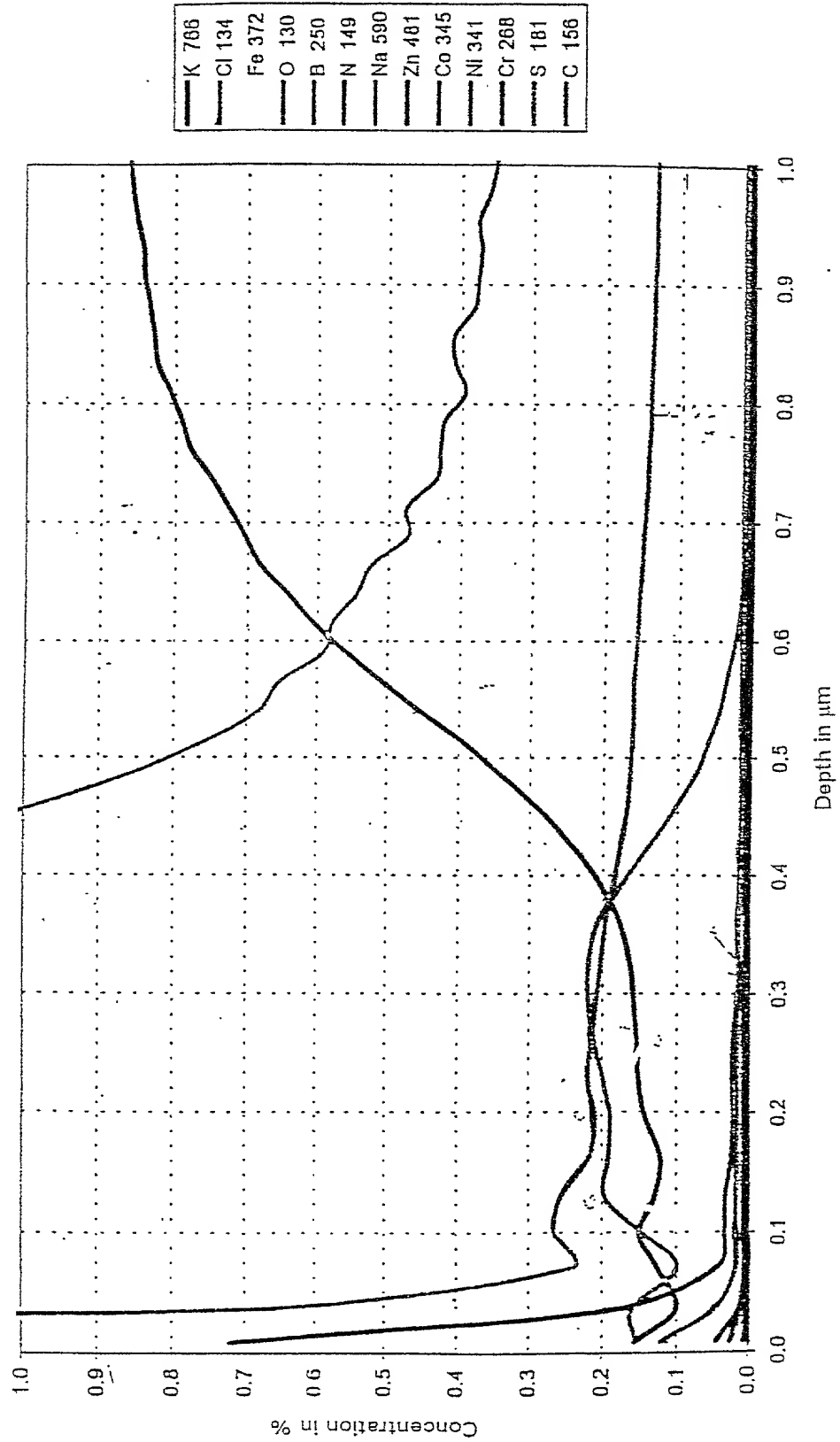
FIG. 9

Diagram 1

Sample 2, Measurement Position A

TOP OF PAGE

Diagram 2
Sample 2, Measurement Position A



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

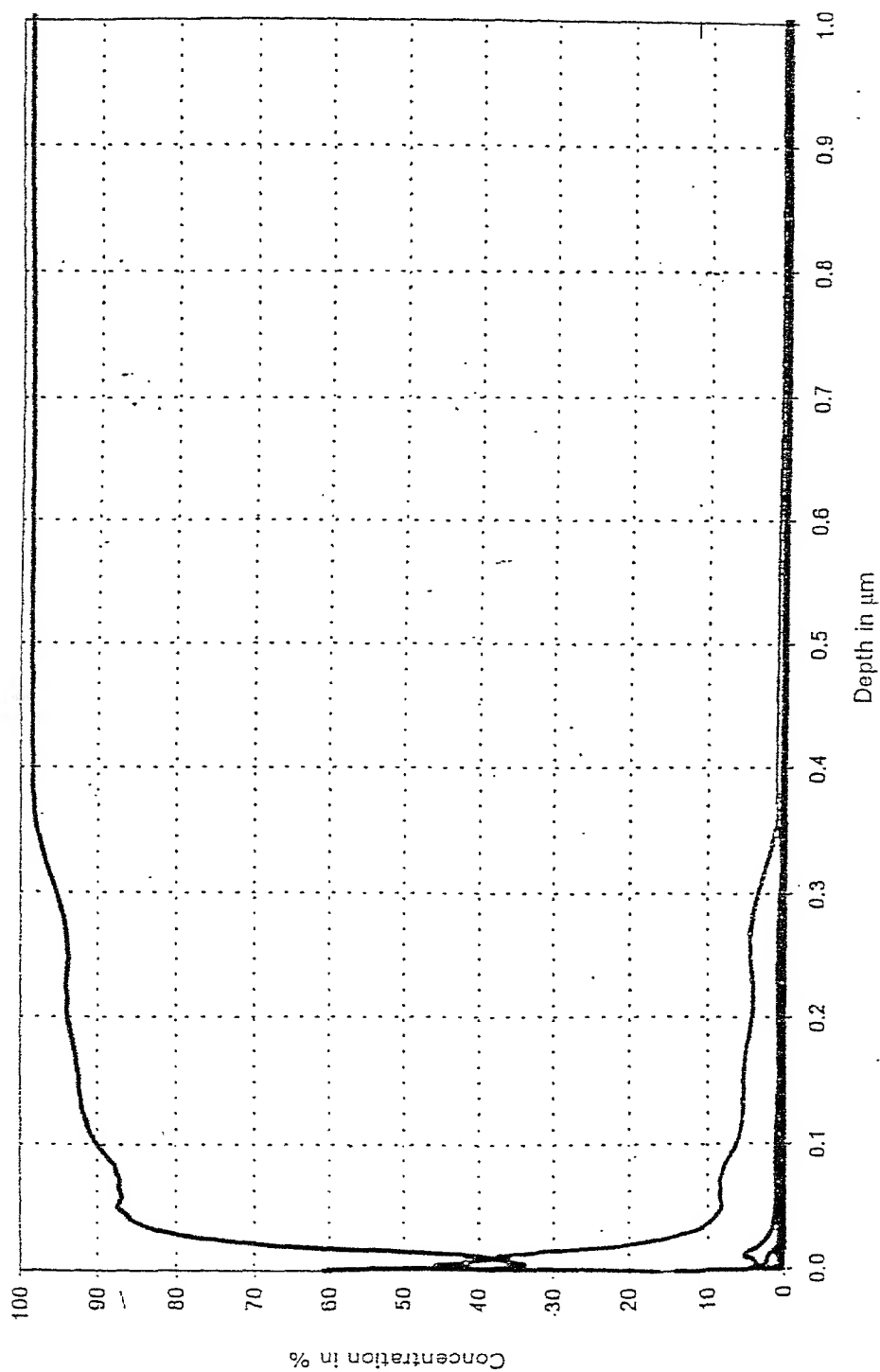


Diagram 1

Sample 2, Measurement Position B

Diagram 2
Sample 2, Measurement Position B

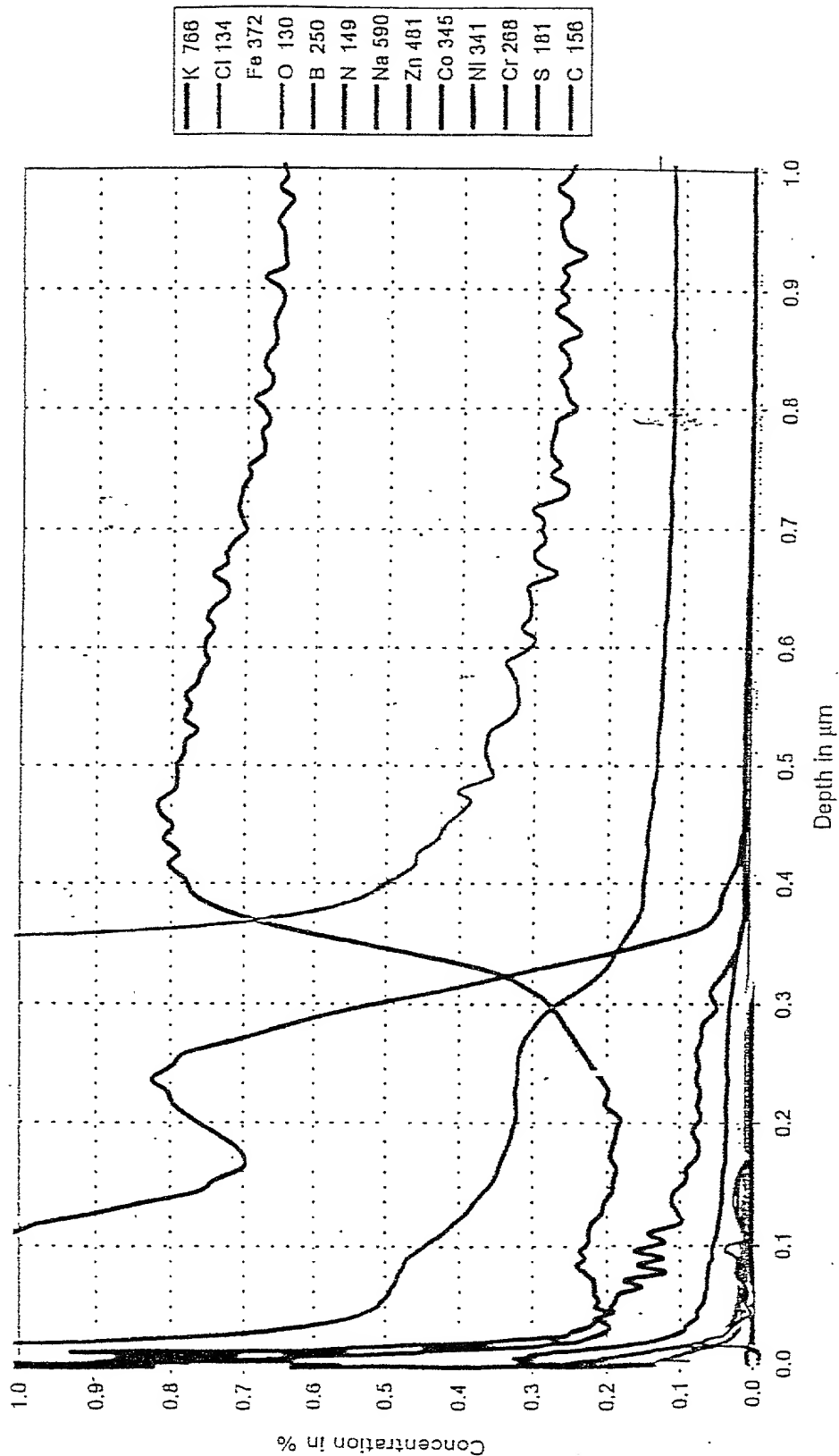
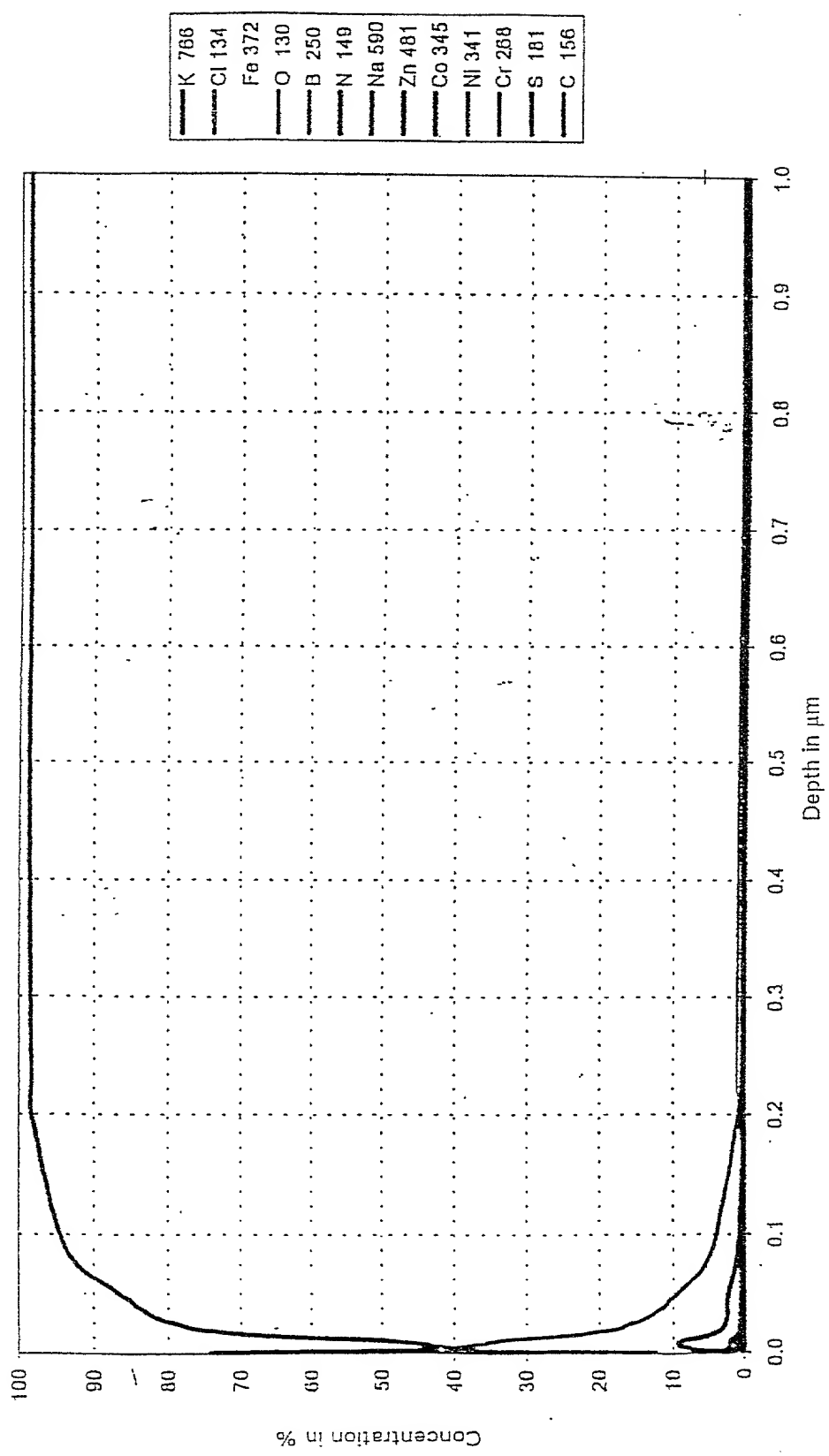


FIG. 12

Diagram 1
Sample 3, Measurement Position A



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

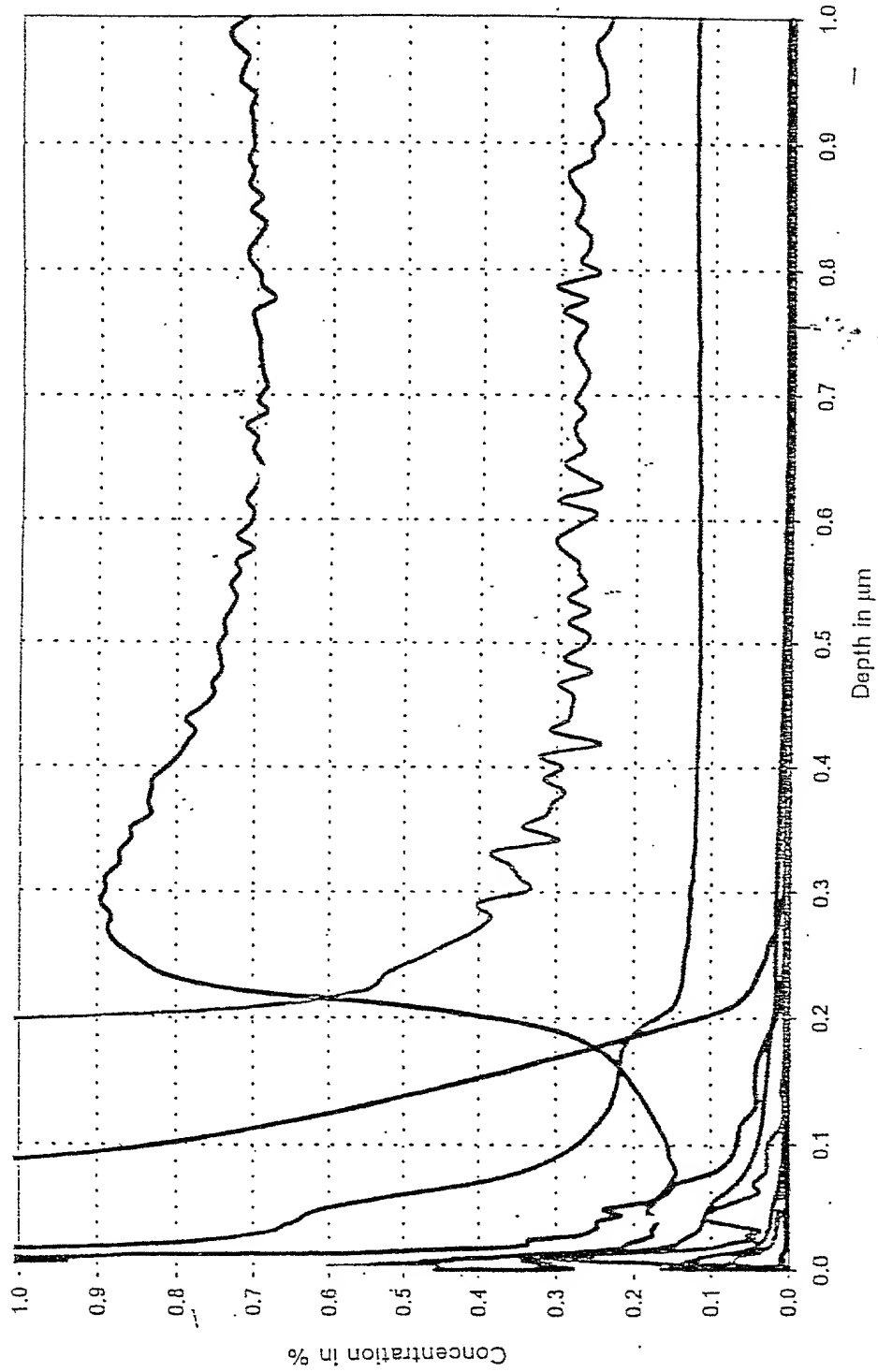


FIG. 14

Diagram 2

Sample 3, Measurement Position A

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FIG. 15

Diagram 1

Sample 4, Measurement Position A

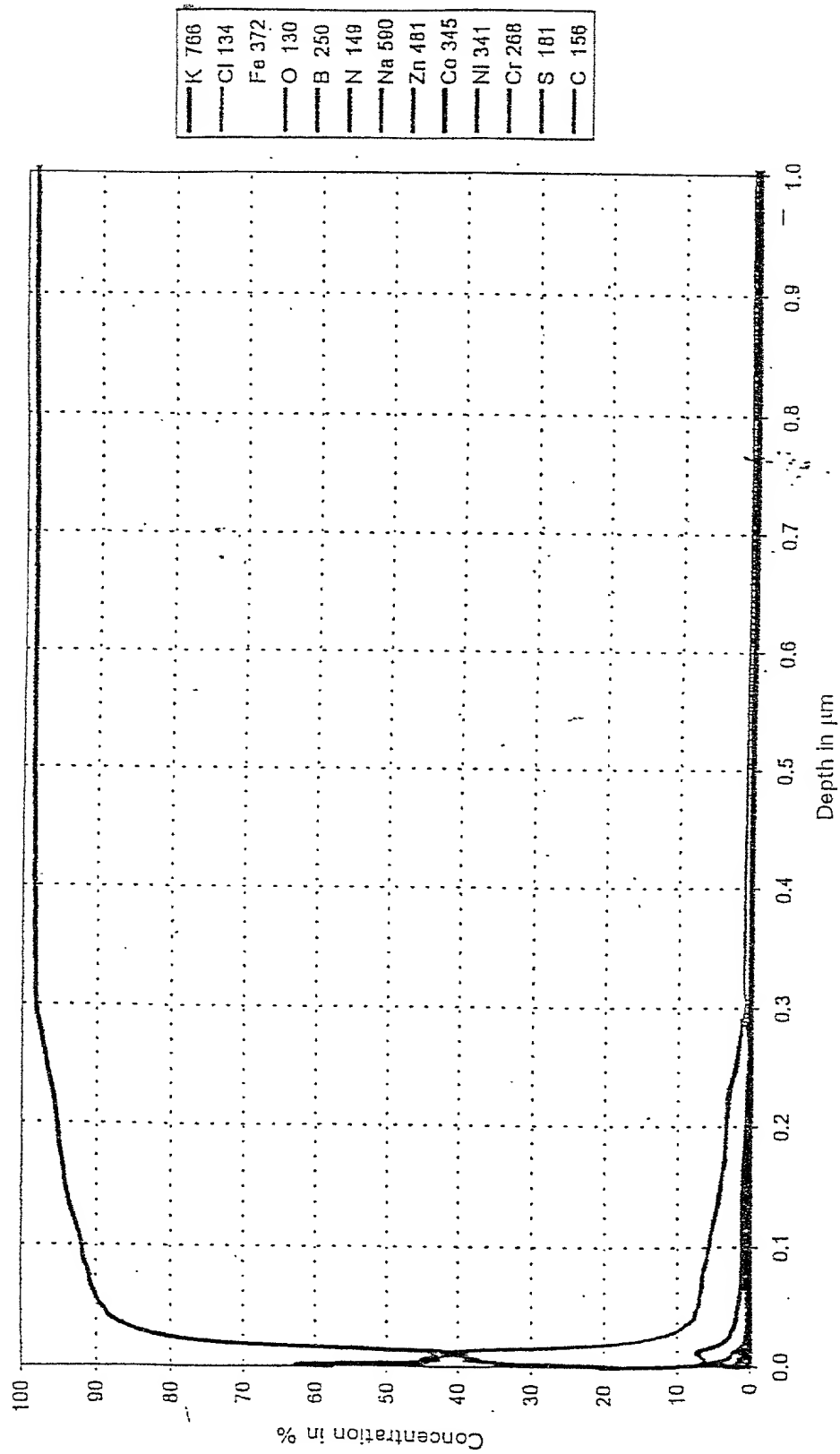


Diagram 2

Sample 4, Measurement Position A

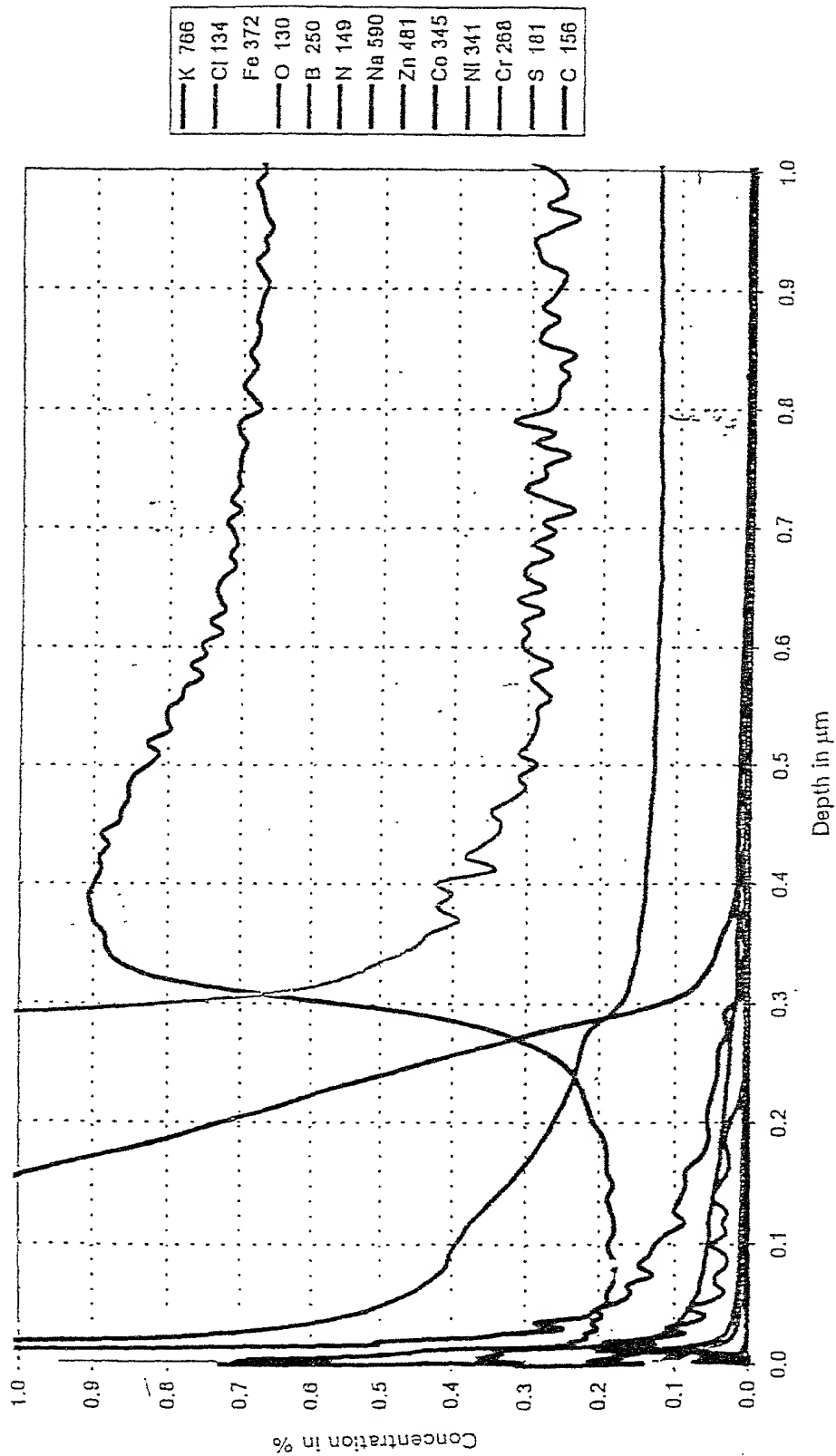


Diagram 1

Sample 5, Measurement Position A

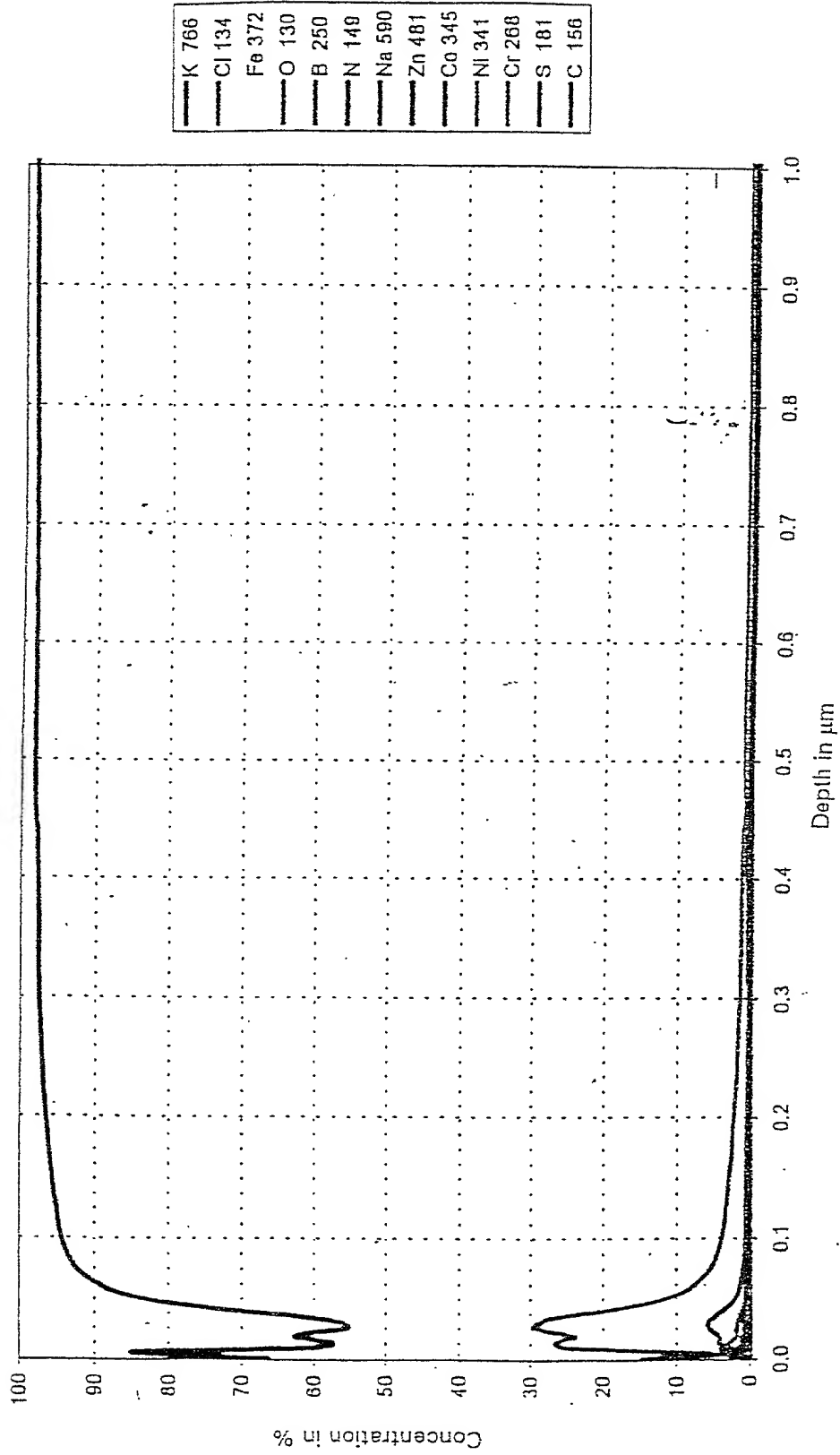
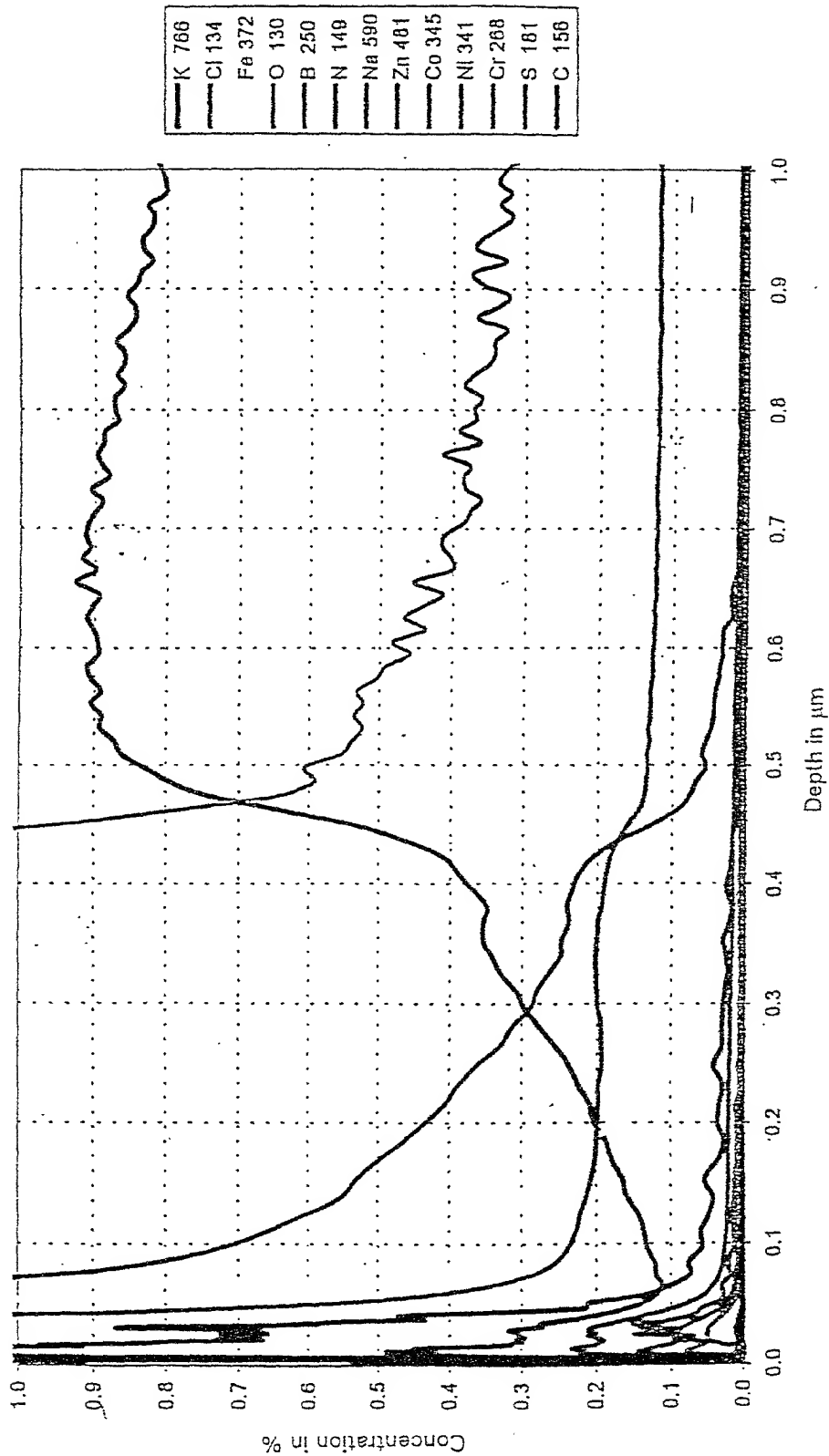


FIG. 17

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Diagram 2

Sample 5, Measurement Position A



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 288
—	S 181
—	C 156

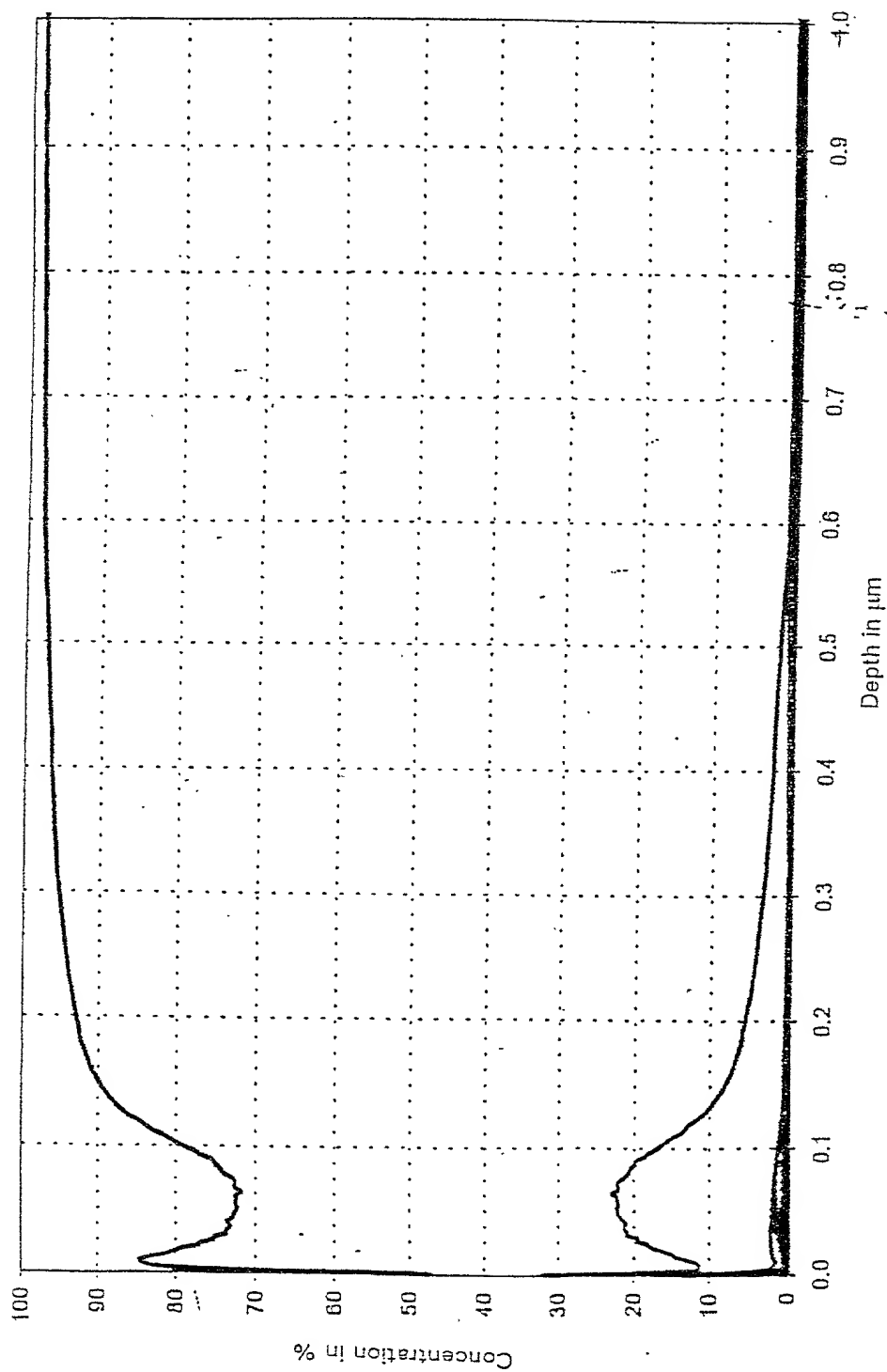


FIG. 19

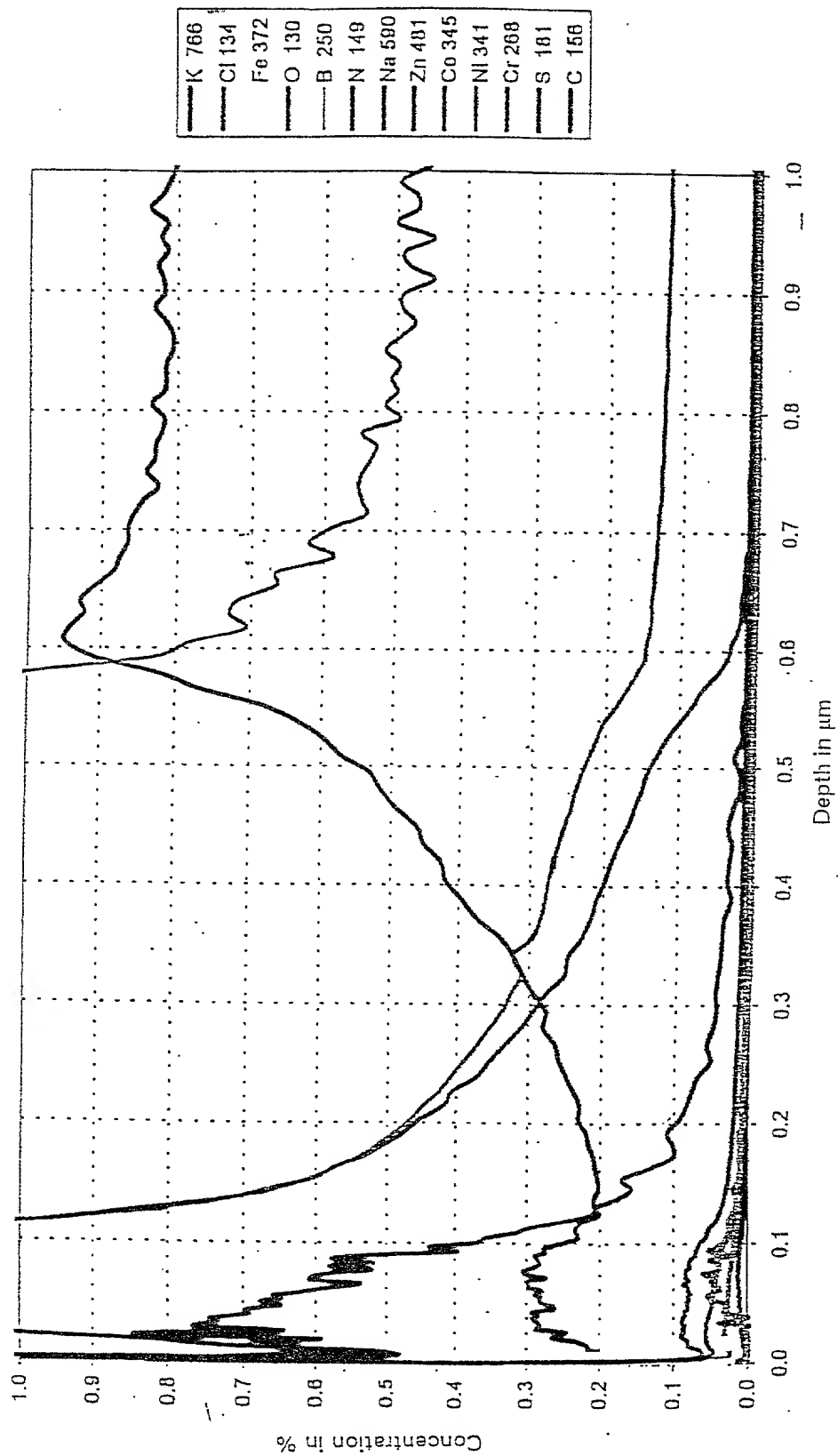
Diagram 1

Sample 6, Measurement Position A

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Diagram 1

Sample 6, Measurement Position A



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 288
—	S 181
—	C 156

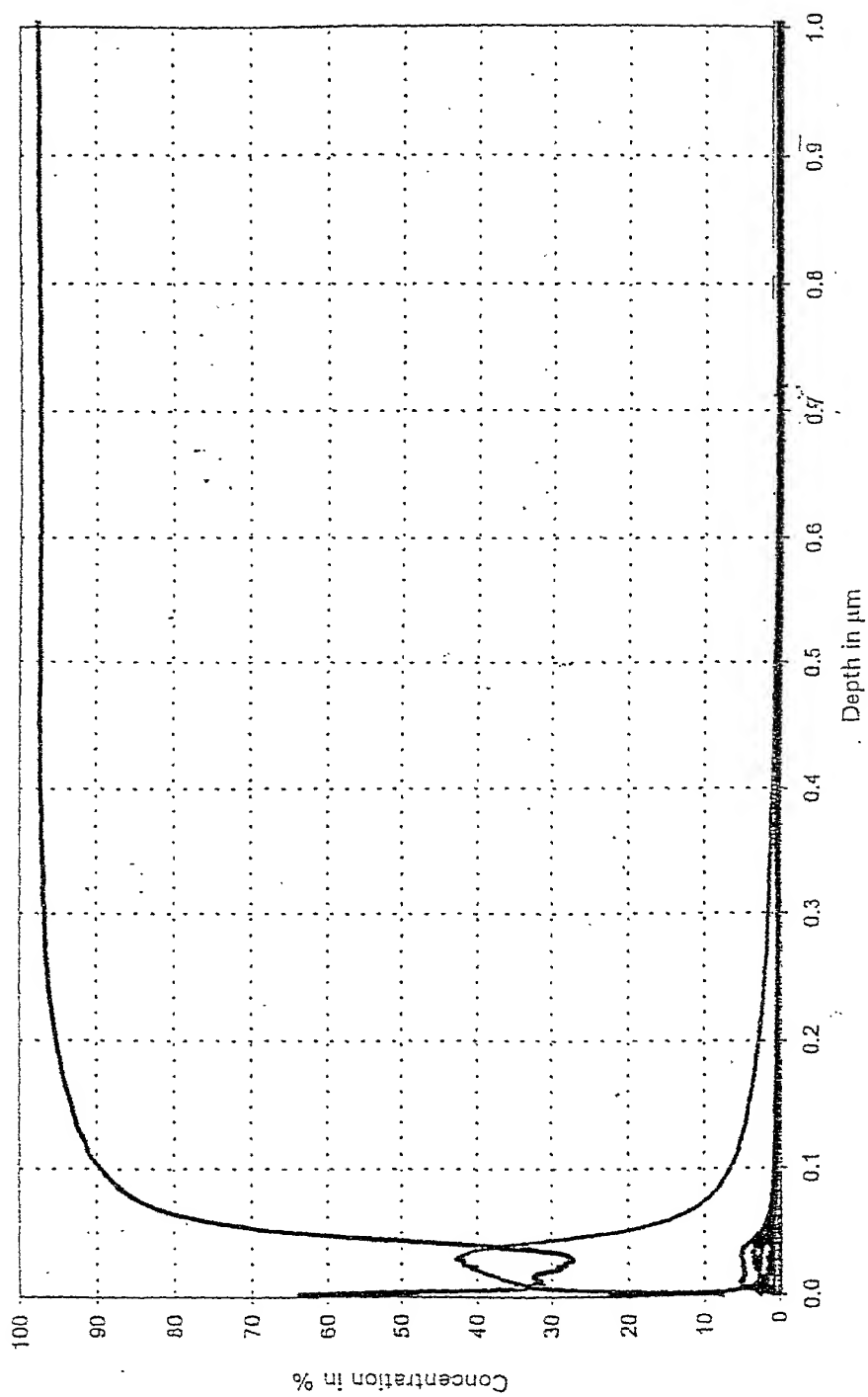


FIG. 21

Diagram 1

Sample 6, Measurement Position B

T03T07 00000000

Diagram 2

Sample 6, Measurement Position B

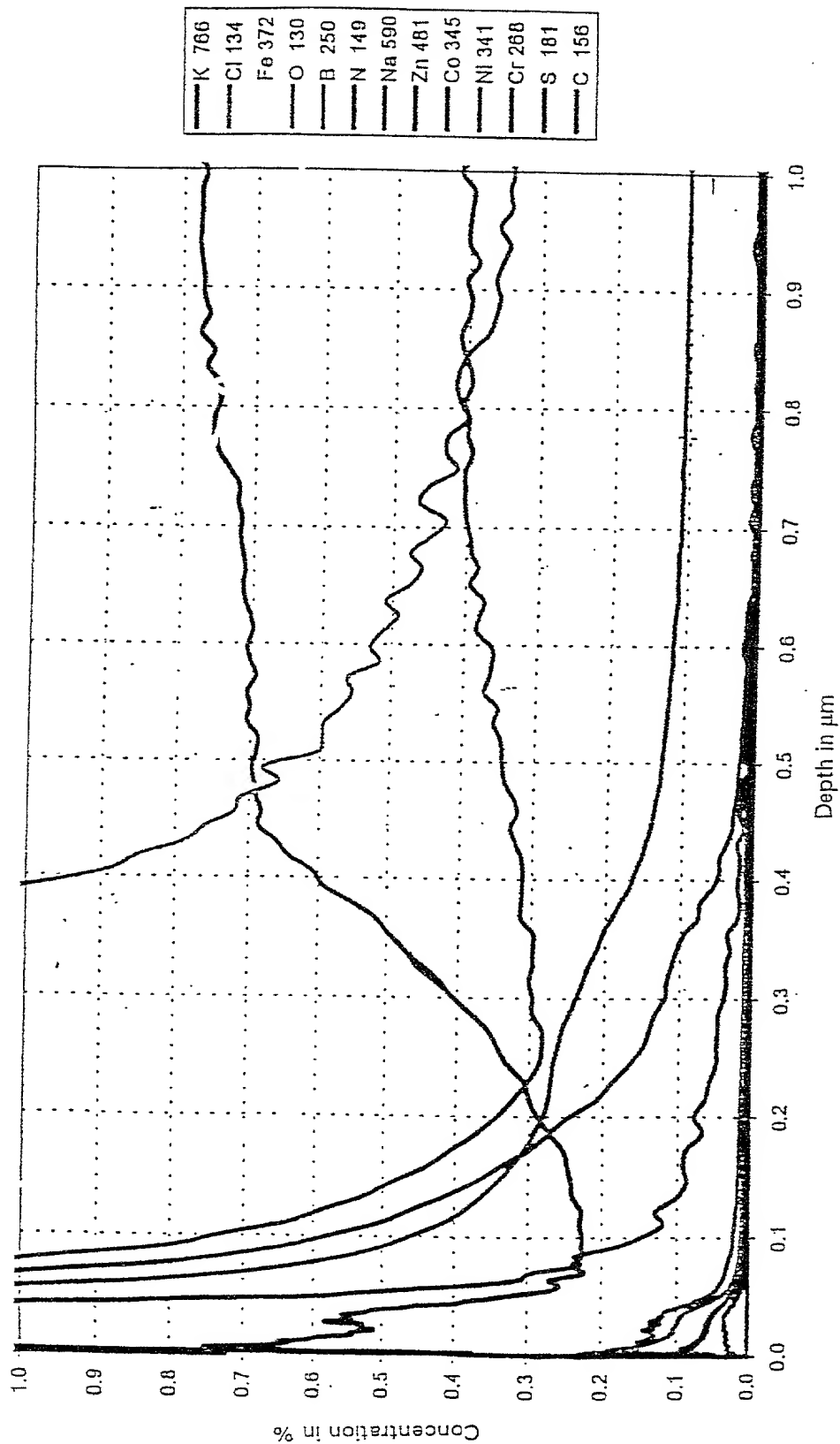


FIG. 22

Diagram 1

Sample 6, Measurement Position C

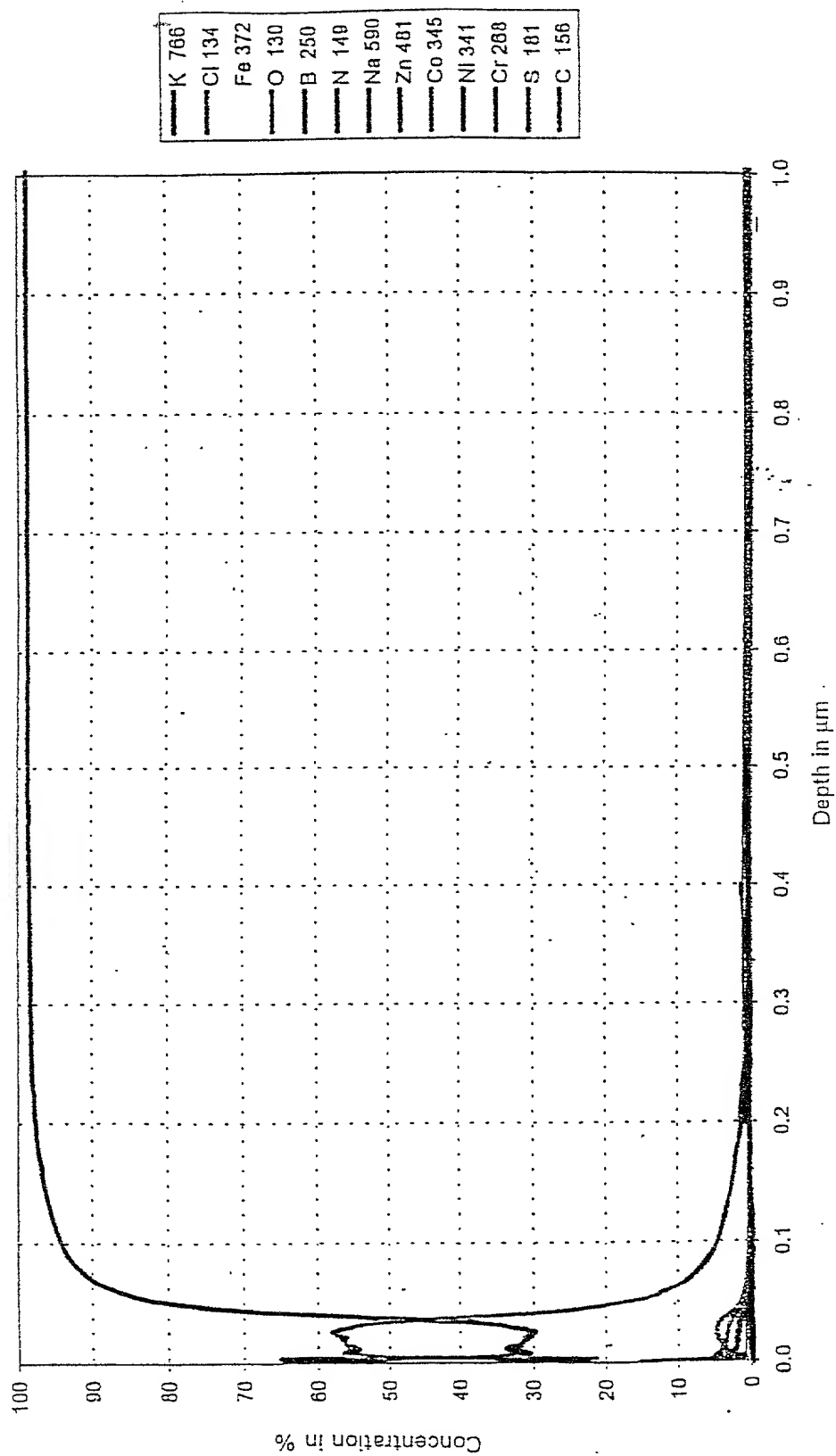


FIG. 23

Diagram 2

Sample 6, Measurement Position C

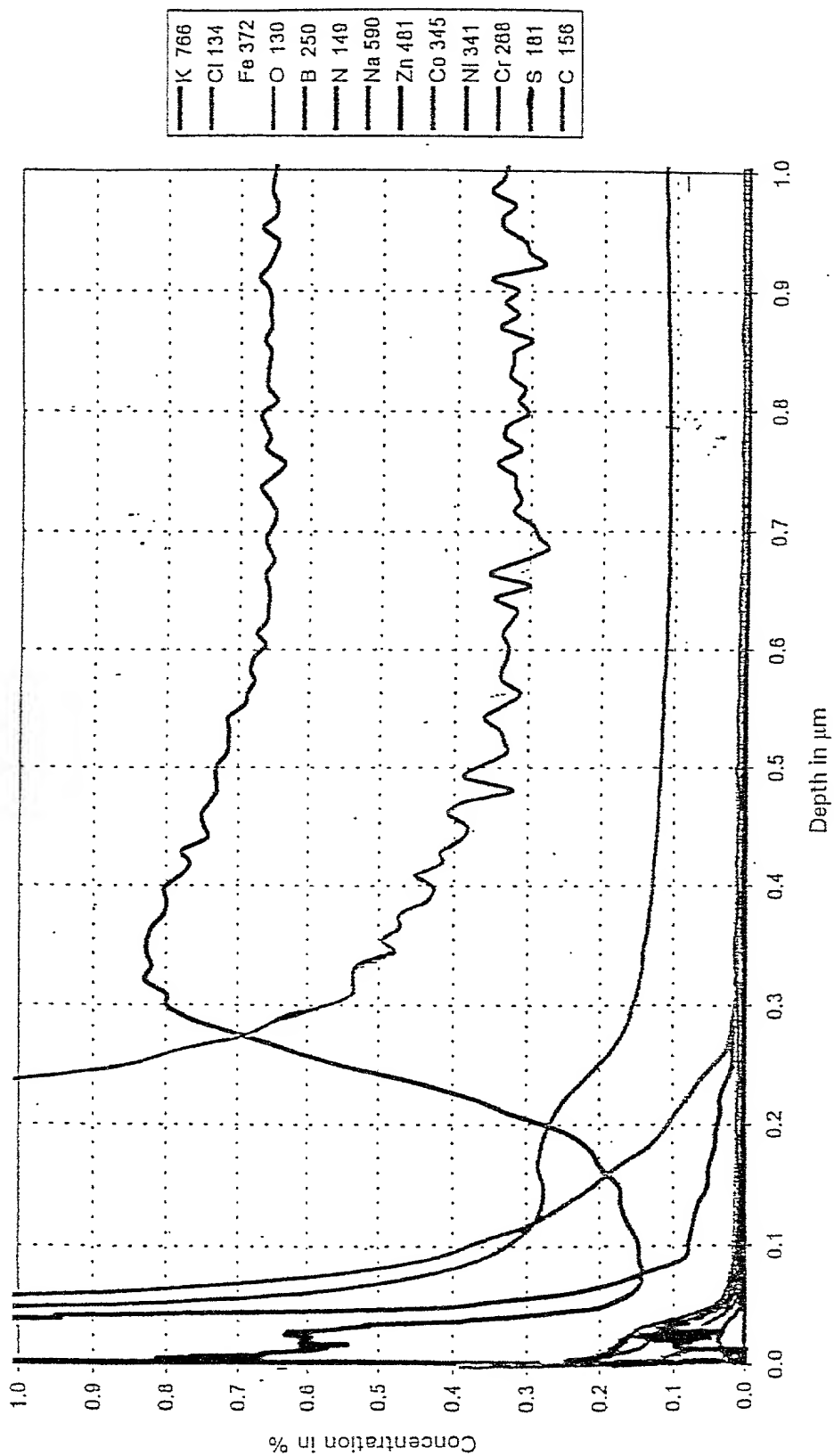
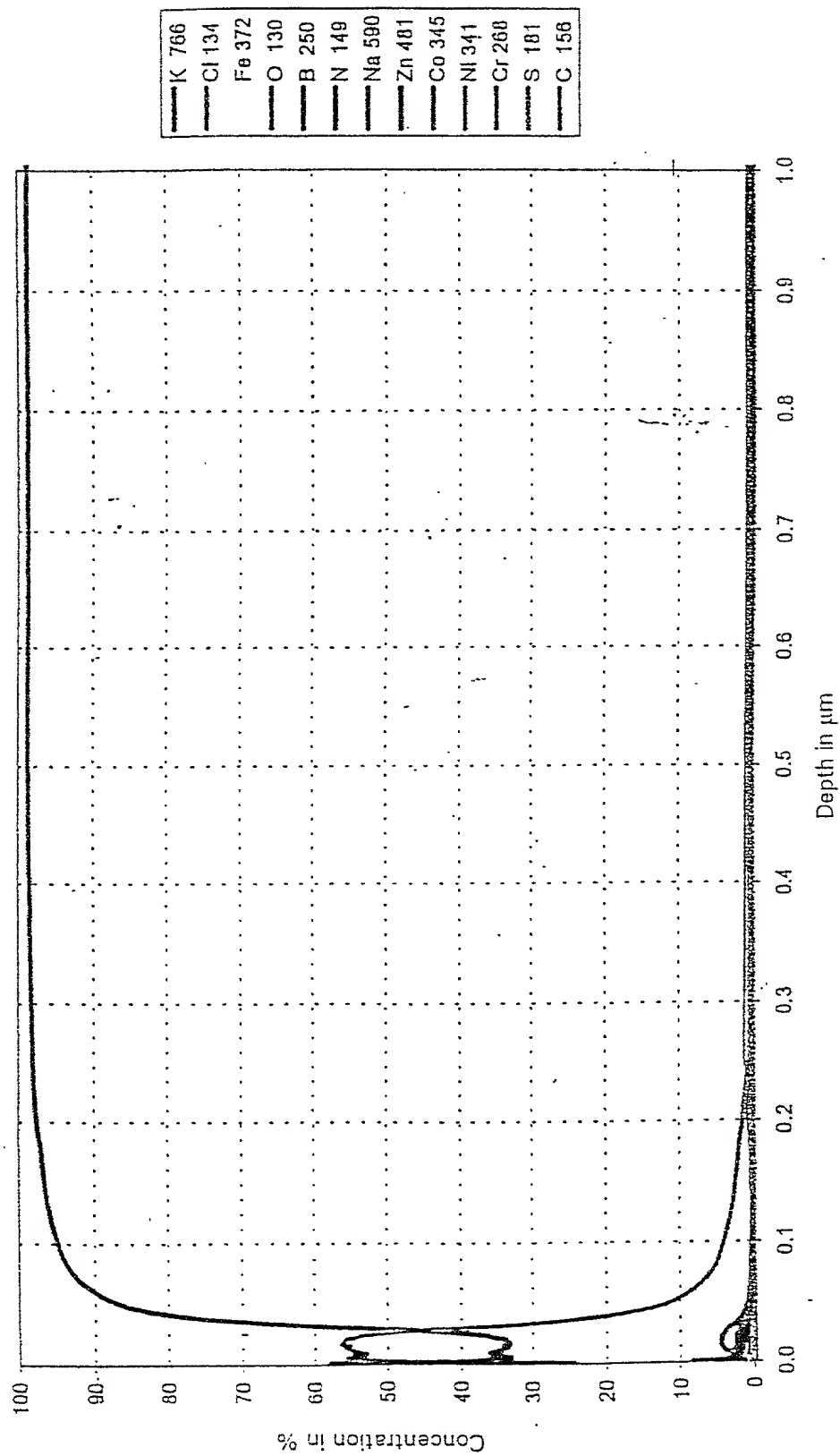


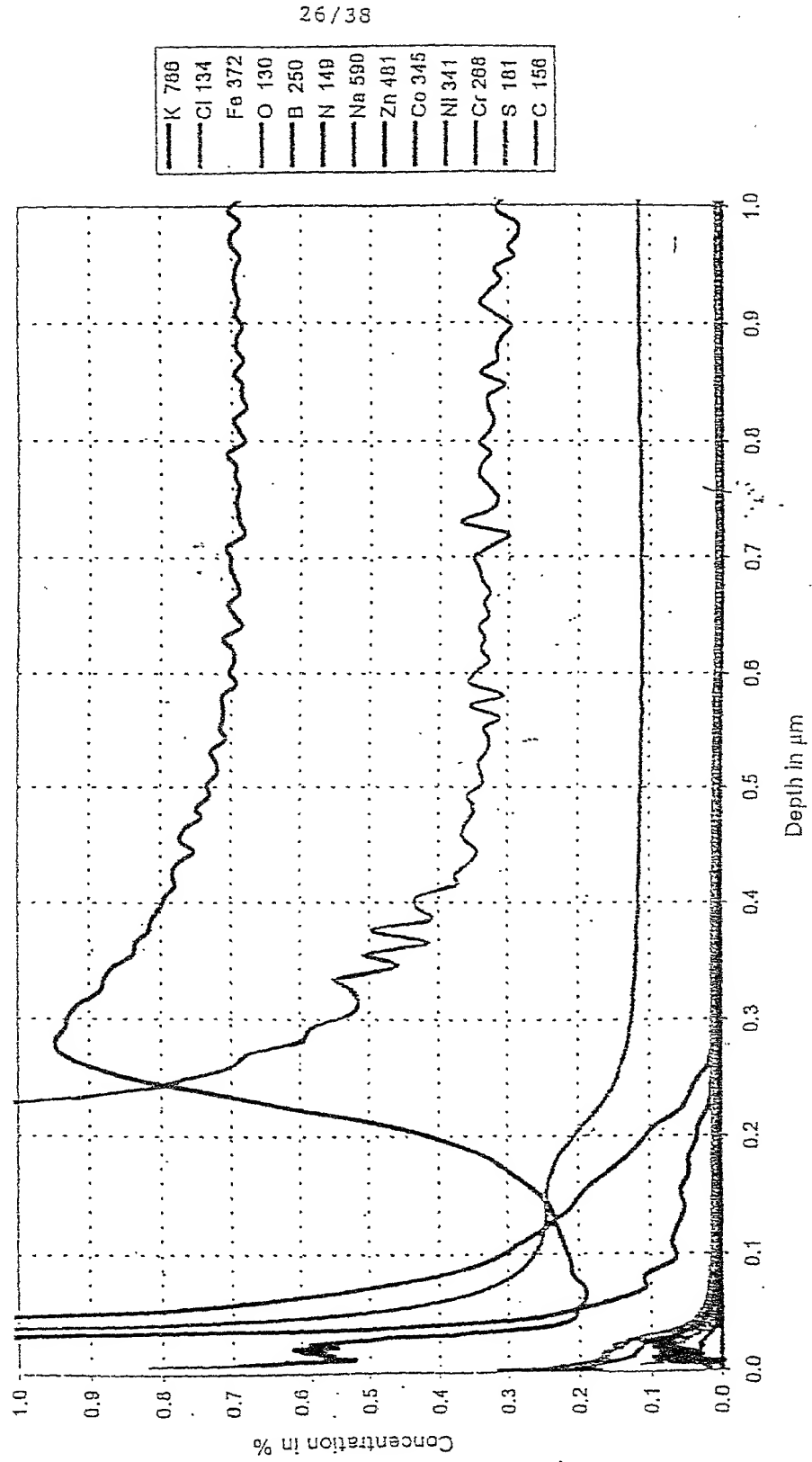
Diagram 1
Sample 6, Measurement Position D



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FIG. 26

Sample 6, Measurement Position D



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 401
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

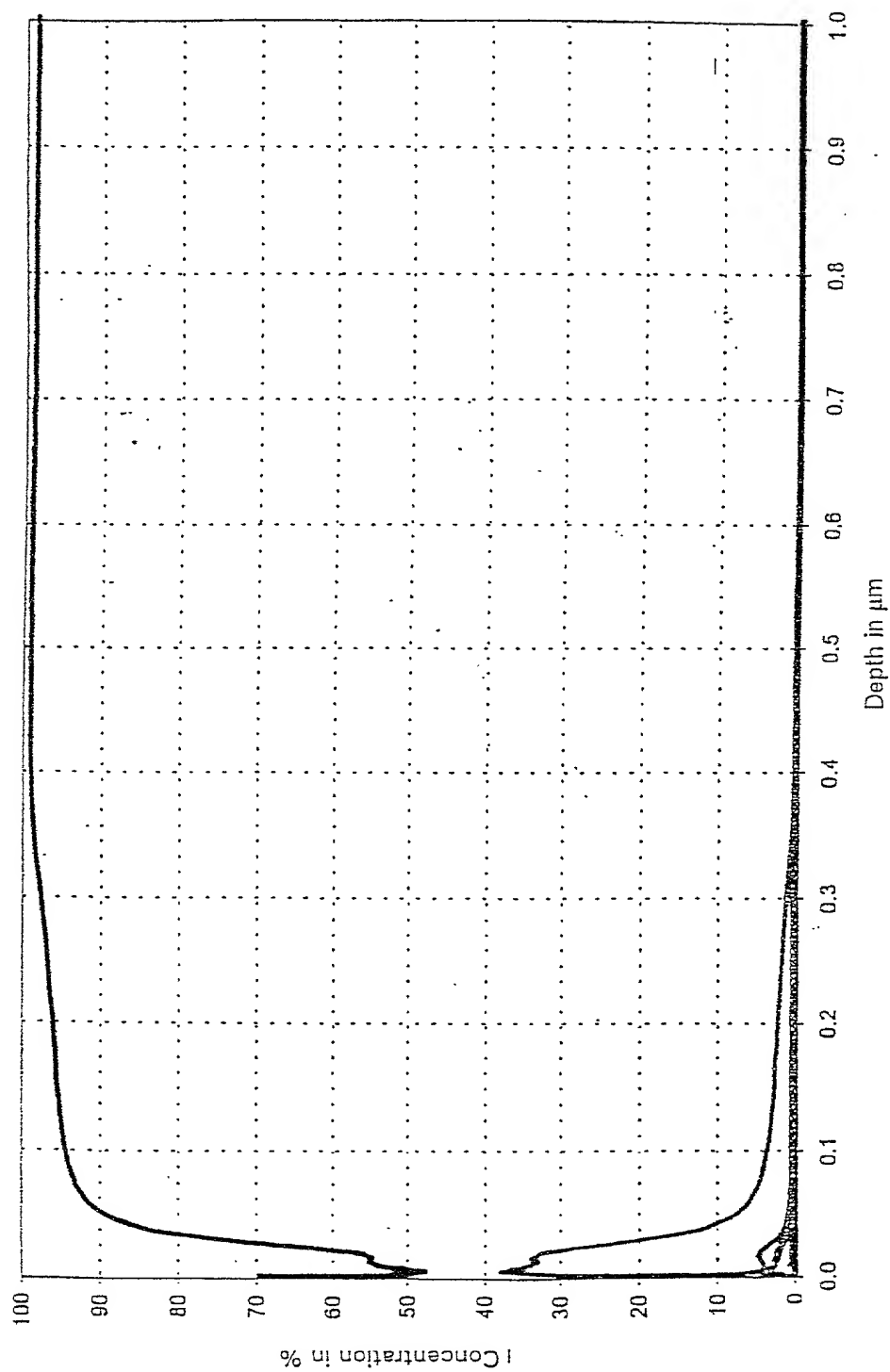


FIG. 27

Diagram 1

Sample 7, Measurement Position A

TOP OF SAMPLE

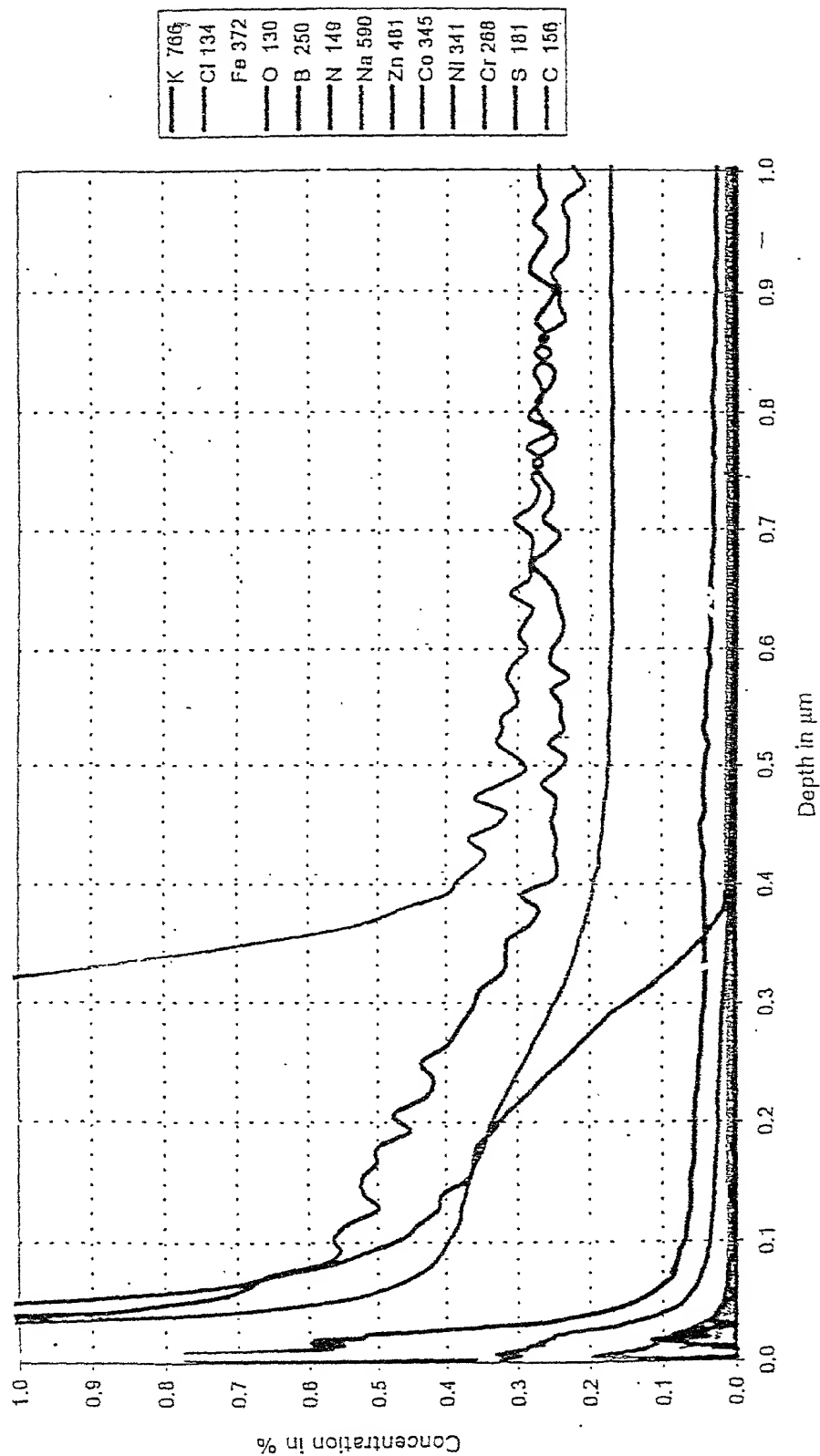
FOOT 660660

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Diagram 2

Sample 7, Measurement Position A

FIG. 28



—	K 786
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

Diagram 1

Sample 7, Measurement Position B

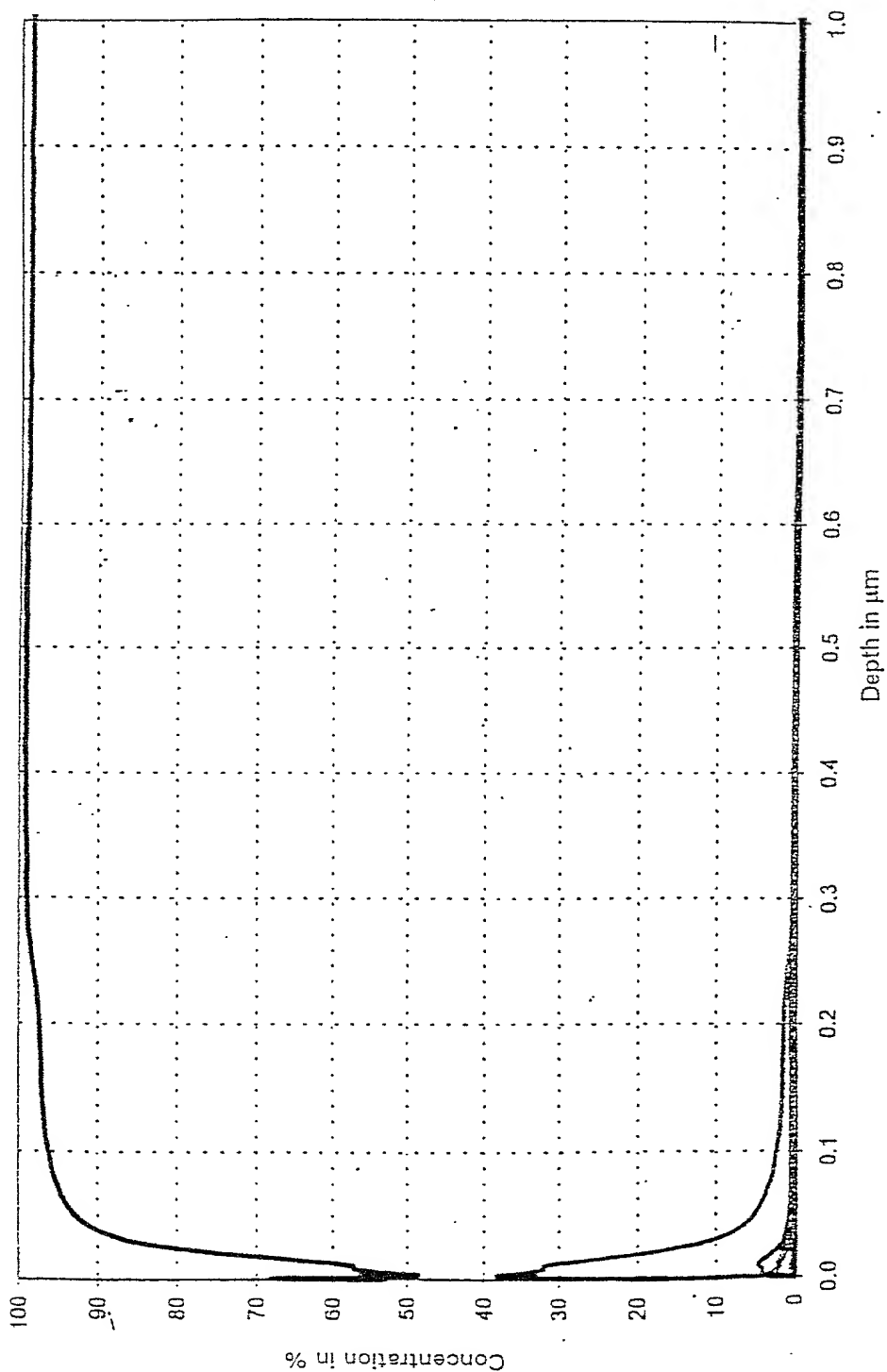
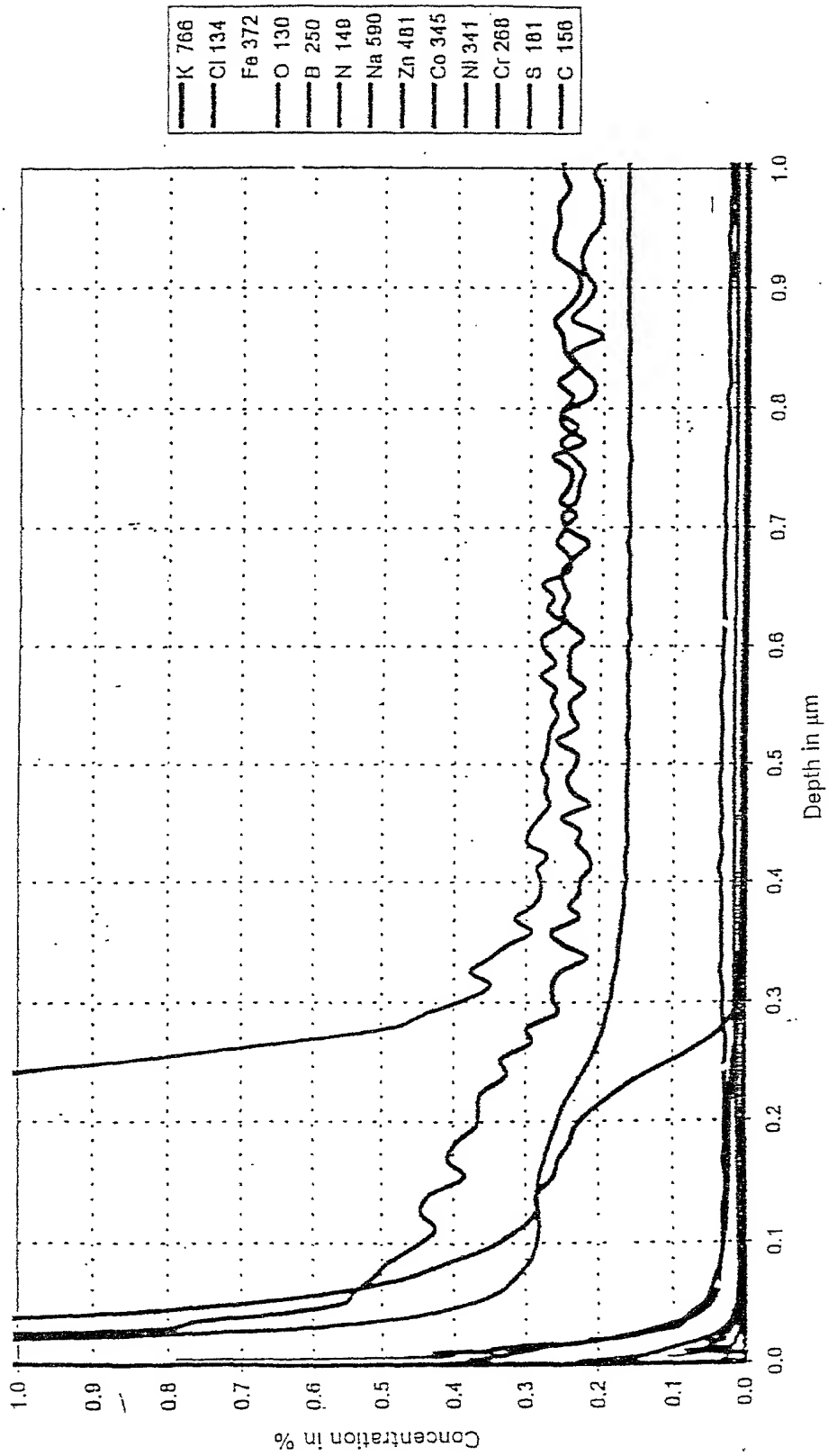


Diagram 2

Sample 7, Measurement Position B

FIG. 30



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 158

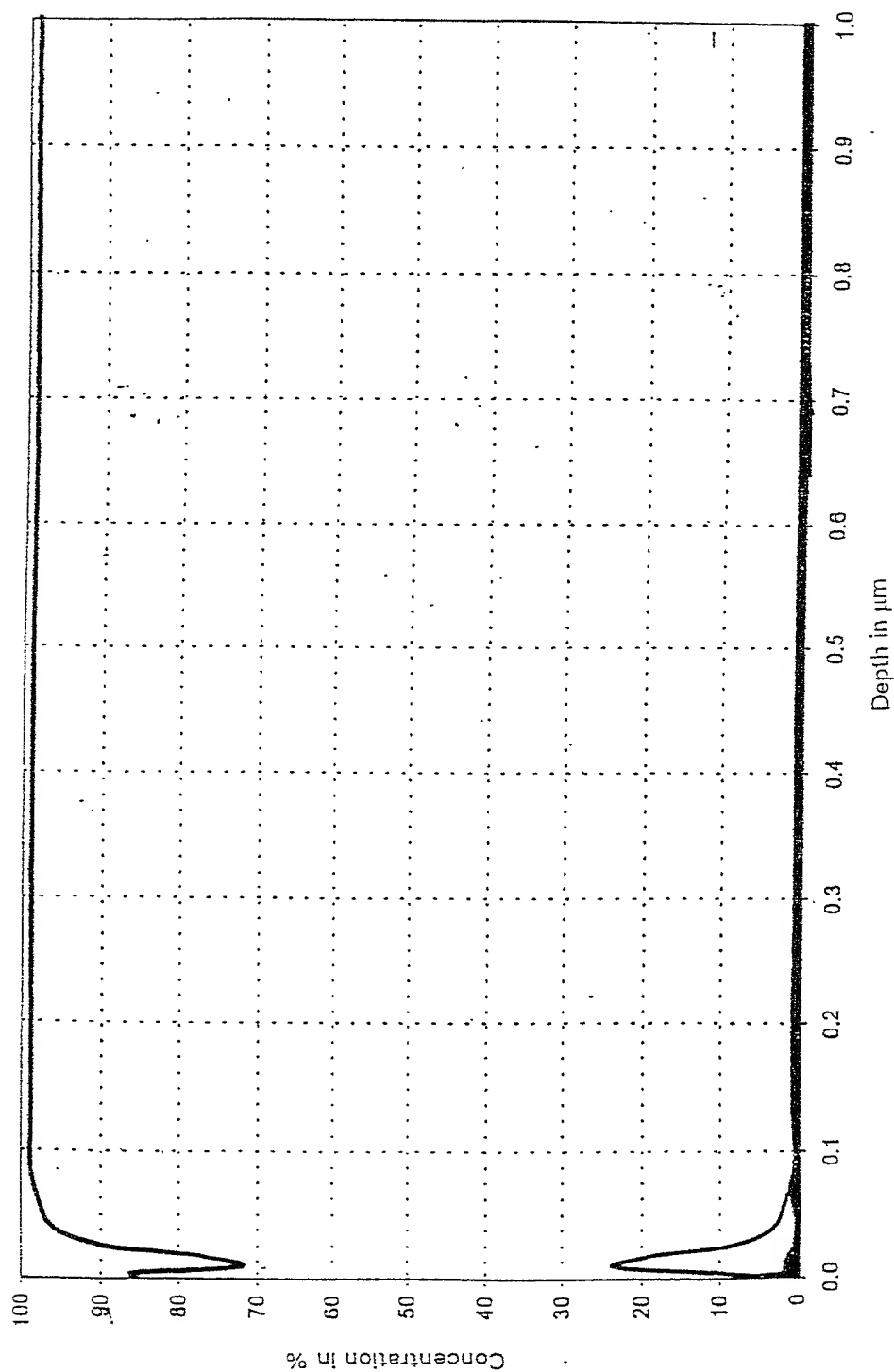


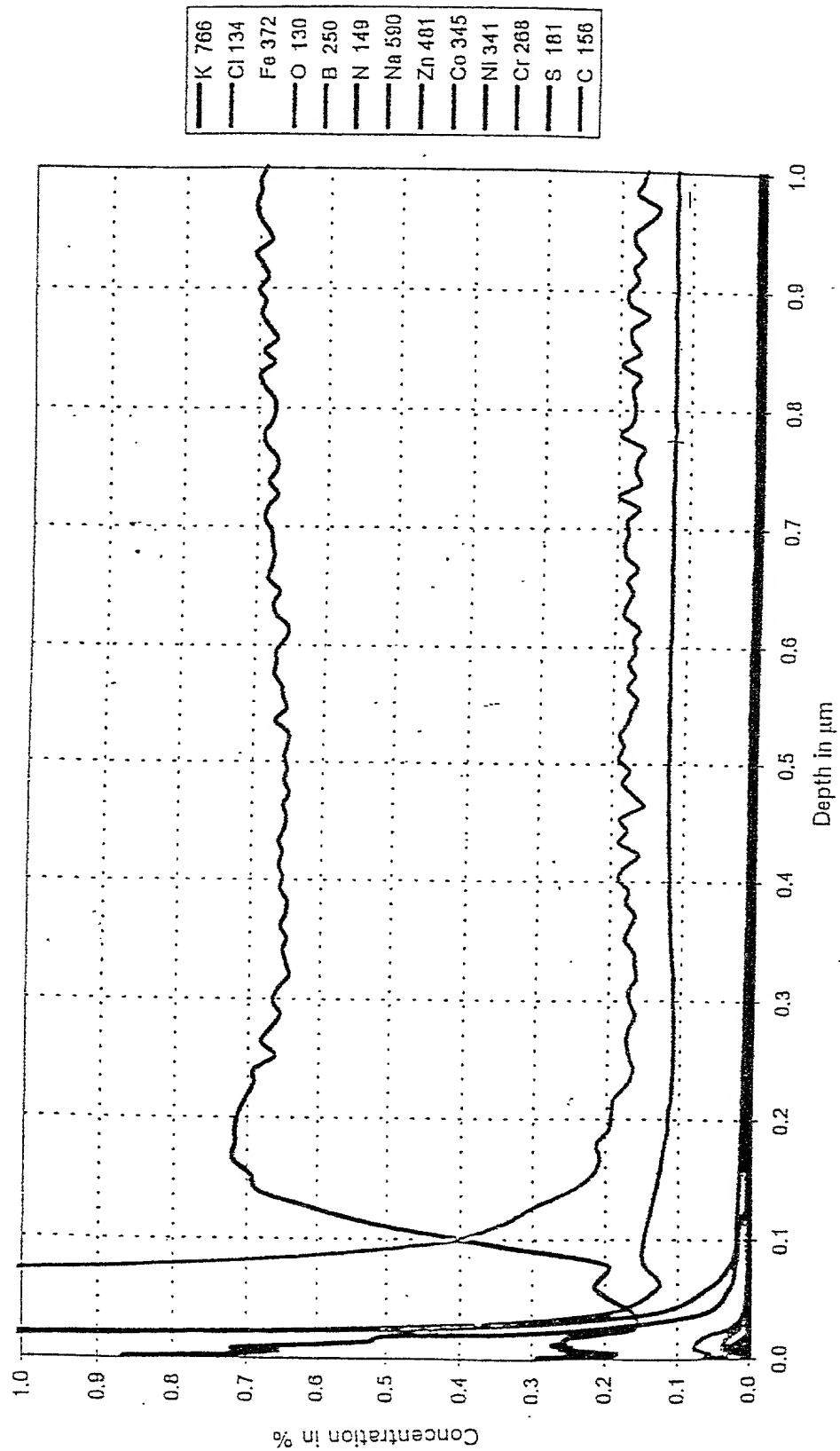
FIG. 31

Diagram 1

Sample 8, Measurement Position A

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Sample 8, Measurement Position A



—	K 706
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

Diagram 1
Sample 9, Measurement Position A

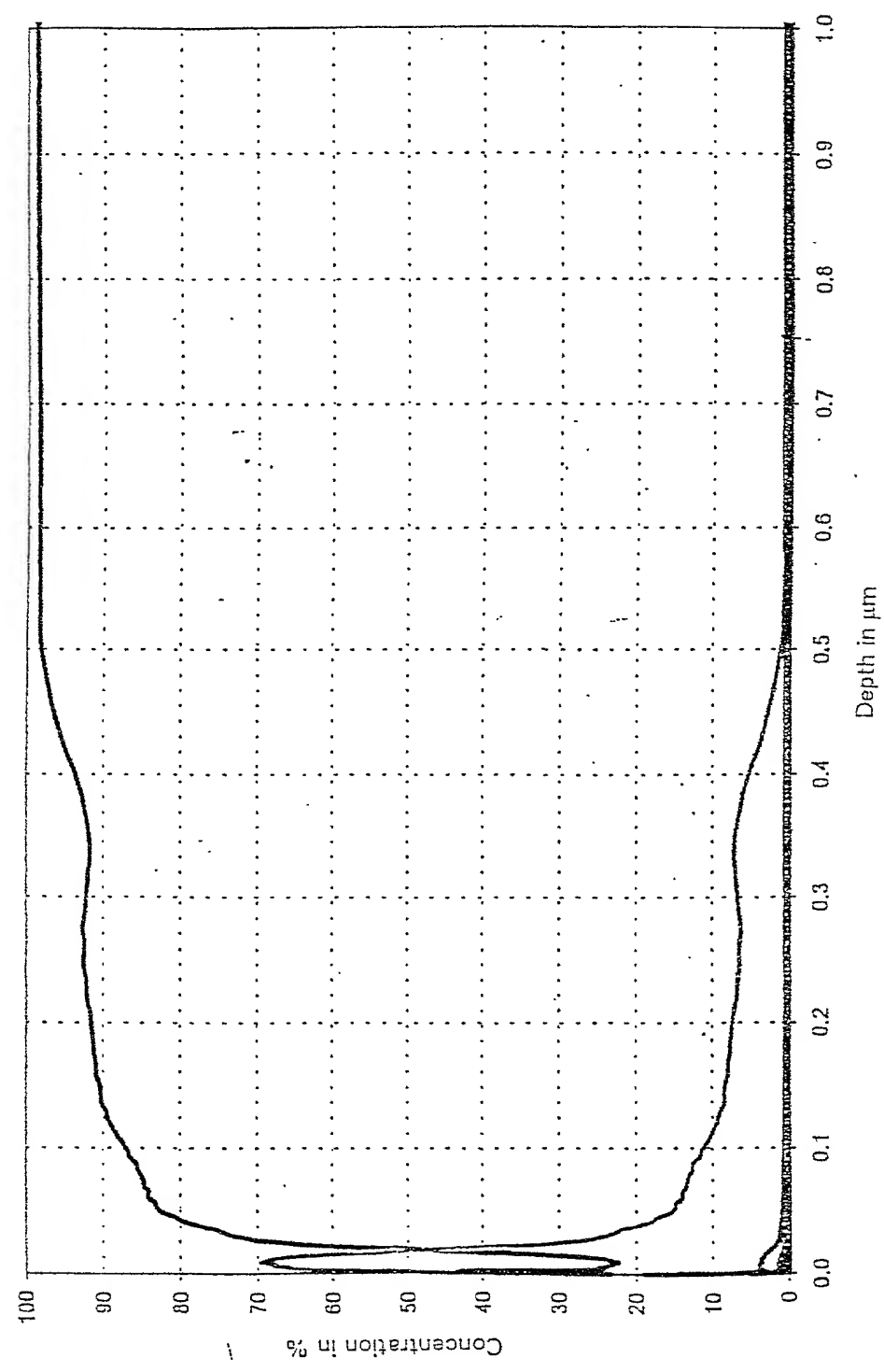


FIG. 33

—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

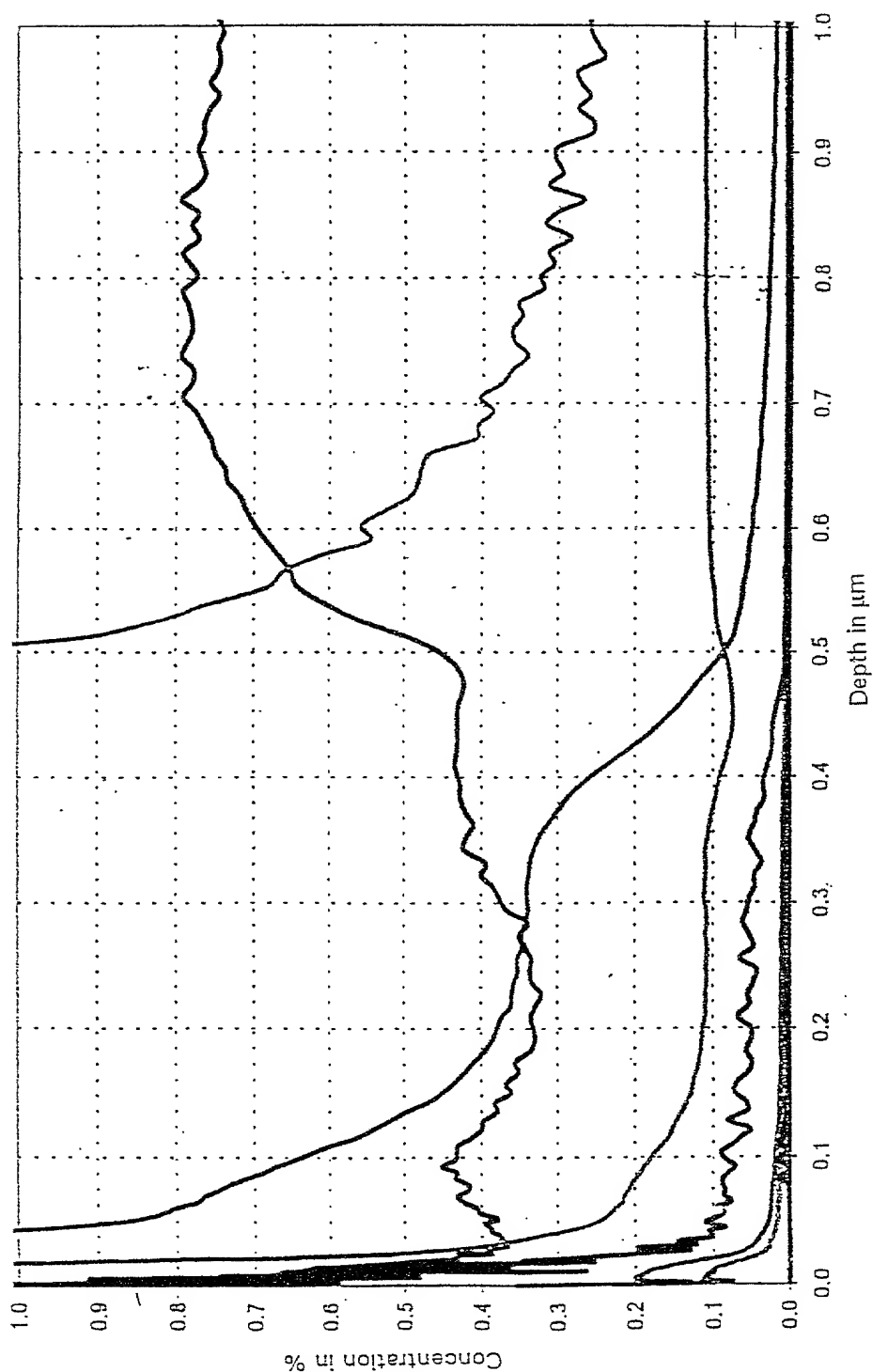


FIG. 34

Diagram 2

Sample 9, Measurement Position A

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Diagram 1

Sample 9, Measurement Position B

FIG. 35

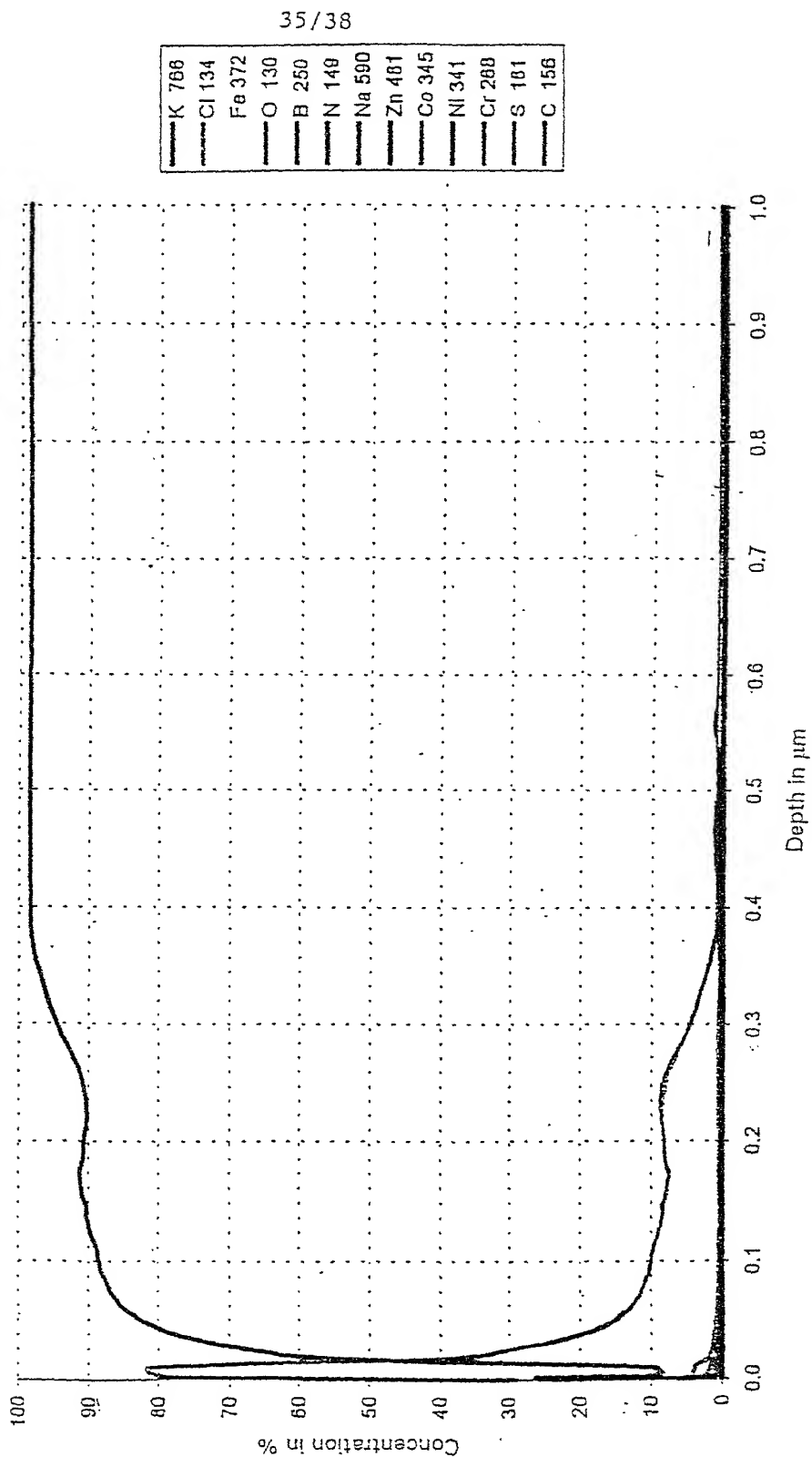


FIG. 36

Sample 9, Measurement Position B

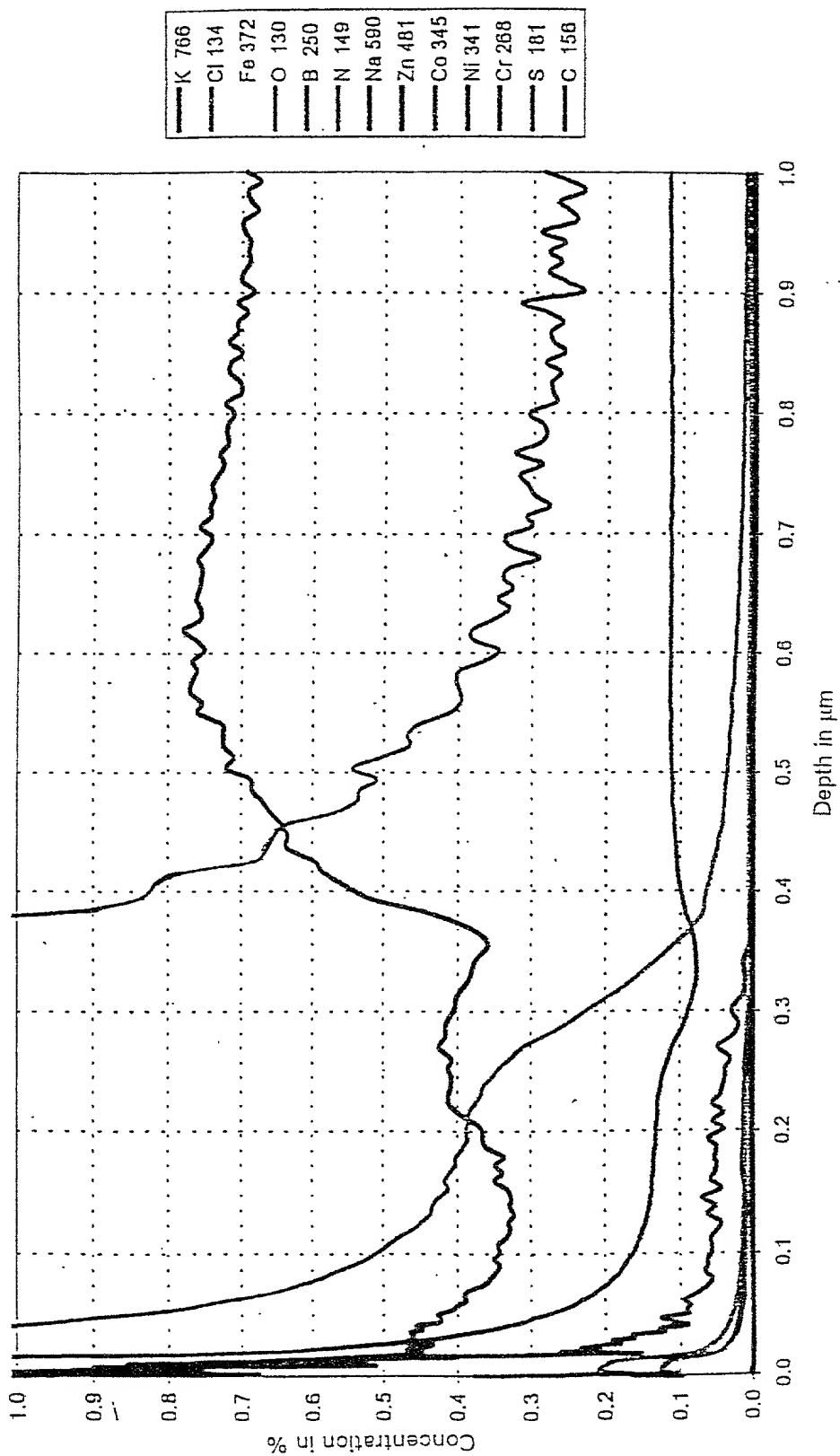
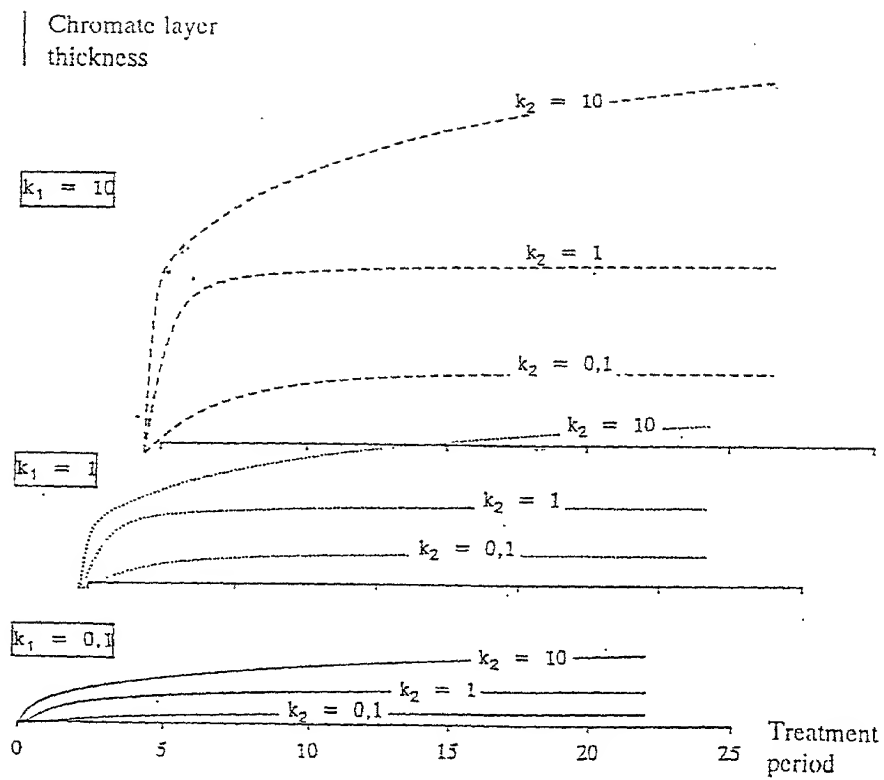


FIG. 37

	Methods			Glow-discharge spectrometer			Sample No.
	Ellipsometry nm	SEM nm		nm (Cr > 1%)	with Cr (%)	chromium index nm (Cr > Zn)	
1. Prior Art							
Yellow chromation Cr(III) + Cr(VI)	-	300		440	11	48	9
Blue chromation Cr(III)	98	60		60	8	5	8
2. Invention (Chromitization)							
60°C Cr(III)	432	300		344	7	23	1,2,3,4,5
100°C Cr(III)	595	-		358	10	38	6
60°C on Zn/Fe Cr(III)	-	-		282	6	16	7
100°C, two-fold concentration Cr(III)	953	-		-	-	-	-

Fig. 38

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Computer simulation of the kinetic model of chromate coating of zinc for various rate constants